

Appendix A: Overfeed Stoker-Fired Boiler System Descriptions and Troubleshooting Diagrams

This TSG Appendix deals with identifying and solving potential coal quality related problems that can be encountered in overfeed stoker-fired boiler systems. A general description of this system is included, but is limited to describing the major components (coal hopper, coal regulating gate, coal-ash bed grates, damper controls) that make up a complete overfeed stoker-fired system. For those interested, more detailed descriptions are provided in references 6, 7, 8.

This Appendix includes a generalized block flow diagram of a complete overfeed stoker-fired boiler system that:

- identifies the specific components comprising the major subsystems of an overfeed stoker-fired boiler system
- logically presents the flow of coal, flue gas, and ash through the system
- helps determine the existence and location of subsystems and specific components comprising the system.

Following the block flow diagram is a component/symptom table that serves to identify:

- typical symptoms (problems) that may be encountered in the system
- the various components shown in the block flow diagram affected by these symptoms
- the logic diagram to determine whether the problem is due to operational procedures or to out-of-specification coal.

The Troubleshooting Logic Diagrams for this Appendix are presented next. However, before proceeding, the reader is encouraged to read Chapter 2 to understand the structure of each Appendix and how to apply these logic diagrams to diagnosing coal quality-related problems. The Glossary, List of Abbreviations, and References preceding the Appendixes should resolve any questions that arise regarding terminology and laboratory procedures.

A1 System Description

A mechanical stoker is equipped with a mechanically operated coal feeding mechanism to feed coal into the boiler while simultaneously distributing it over the grate, admitting air to the coal for combustion, and removing ash. A specific type of mechanical stoker—the overfeed stoker—is one in which coal is admitted above the point of air admission to the coal bed.

There are three basic types of mechanical overfeed stokers: chain-grate stokers (Figure 1-1), traveling-grate stokers, and vibrating grate stokers (Figure 1-2). Fundamentally, chain- and traveling-grate stokers are similar except for grate construction. In the chain grate, the grate itself is a wide chain composed of links. In the traveling grate, the grate sections (bars or links) are attached to a separate chain. In either case the chain travels over two sprockets, one at the front and one at the rear of the furnace. These sprockets are equal in length to the width of the furnace. The front sprocket is connected to a variable-speed driving mechanism.

Chain- and traveling-grate stokers operate similarly. Coal is gravity fed onto the grate from a coal hopper mounted on the front of the stoker. The depth of coal fed on the grate is regulated by raising and lowering a sliding coal gate at the hopper coal discharge (Figure 1-1). The coal burns as the grate travels from one end of the furnace to the other. The ash is continuously deposited off the rear of the grate into an ash pit.

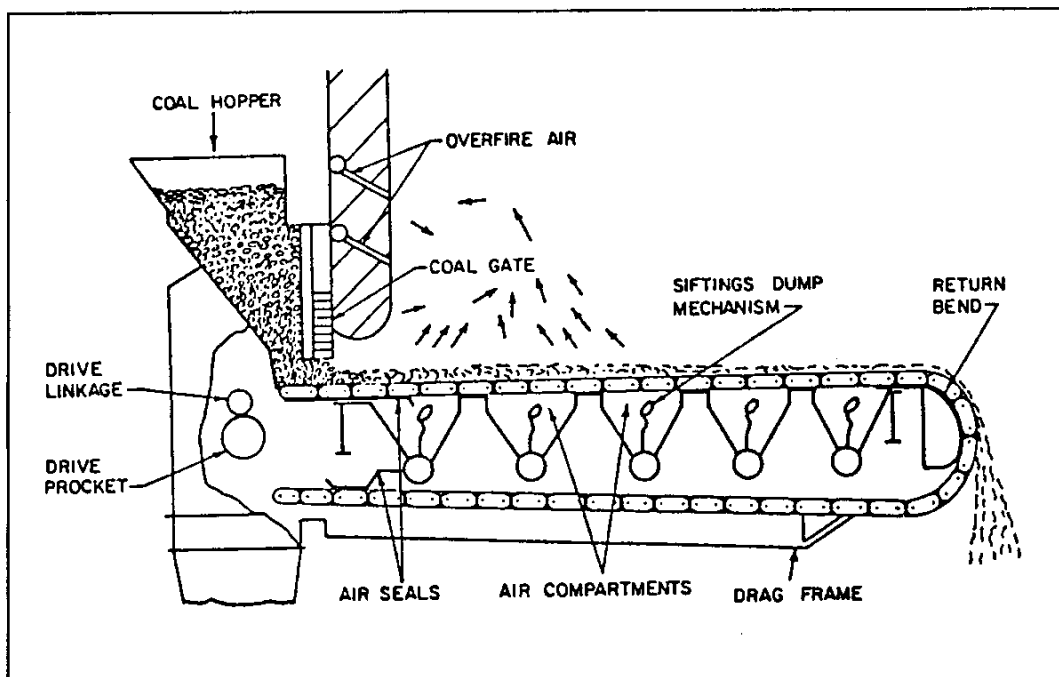


Figure 1-1. Chain grate stoker.

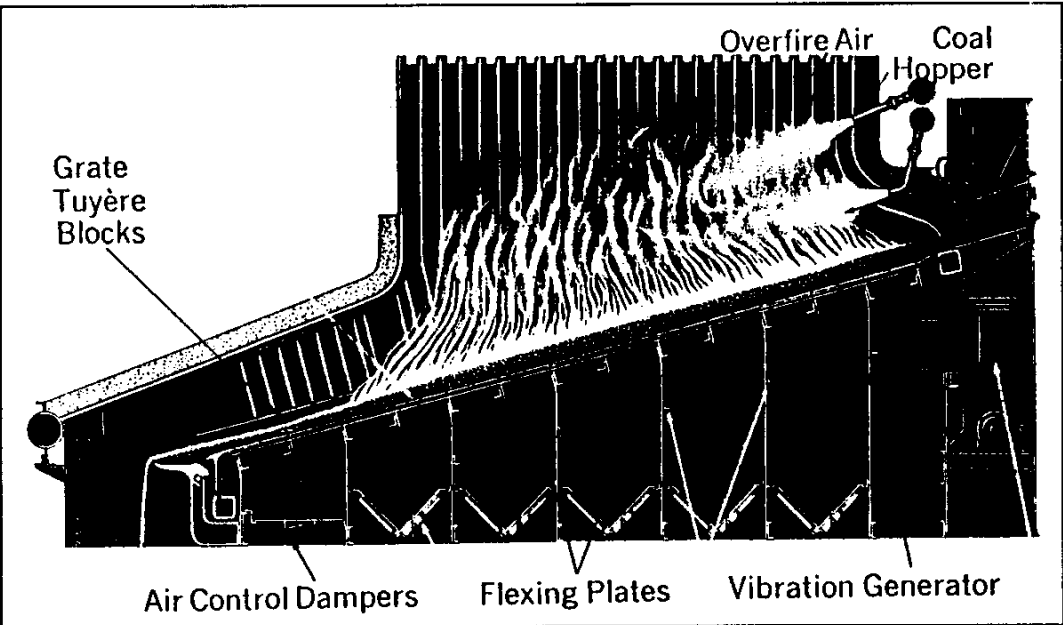


Figure 1-2. Vibrating grate stoker.

Air for combustion enters through openings in the grate (undergrate air) and through overfire air jets. Undergrate air is manually controlled through individual air zones or compartments underneath the grate. Air from overfire air jets enters the furnace through the front arch—roofs over parts of the furnace used to direct the flame and to protect parts of the boiler from direct heat—or the front wall above the arch. Over-fire air and undergrate air that passes through the fuel bed, provide turbulence (mixing of combustible gases) for rapid combustion. Overfire air jets can also be located at the rear wall to provide a counterflow of gases in the furnace, promoting increased turbulence and further reducing smoke emissions.

Vibrating grate stokers (Figure 1-2) operate similarly to chain- and traveling-grate stokers. However, the vibrating stoker uses vibration and gravity to move the coal-ash bed from coal feed to ash discharge. Coal that is gravity fed from a coal hopper onto the grate passes underneath a gate that controls the thickness of the coal bed on the grate. The grate is vibrated by a vibration generator that consists of two unbalanced weights rotating in opposite directions to impact the desired vibration to the grates. The vibration and inclination of the grate causes the coal bed to move through the furnace toward the ash pit.

Flexible plates divide the space beneath the combustion grate into compartments. Individual supply ducts with dampers regulate air distributing through the coal-ash bed. Overfire air jets on the front wall promote mixing of volatile gases and air for more complete combustion.

A2 Block Flow Diagram

The overfeed stoker-fired boiler system has been divided into 15 specific subsystems or components (the performance of which can be significantly impacted by coal quality), sequentially arranged to show:

- coal flow through the coal handling equipment
- flue gas flow through the boiler/components, flyash recycle and flue gas cleanup (FGC) subsystem, the induced draft fan and chimney/stack
- ash discharge to the ash hopper/pit.

These specific components are identified in Figure 1-3. The first six components have been grouped collectively under a category entitled coal-handling equipment. Coal-handling equipment includes all components that process the coal from its delivery on site to the coal regulating gate. It includes equipment that, depending on plant design, may include:

- coal reclaim systems such as belt feeders, vibrating feeders, screw feeders and reciprocating feeders
- coal feed conveyors such as belt conveyors, screw conveyors, bucket conveyors, redler conveyors, and chutes
- components that store the coal such as bunkers and hoppers
- coal feeders that transport coal to the stoker coal hopper
- coal regulating gates that serve to control coal flow rate and coal bed depth on the grates.

The next four components have been loosely grouped under the category entitled Boiler/components. Again, it includes equipment that, depending on plant design, may include:

- forced draft fan
- grates (specifically chain grates, traveling grates and vibrating grates)
- refractory surfaces
- heat transfer surfaces - boiler tubes, water walls and baffles.

The next two blocks represent the flyash recycle and particulate removal subsystems. Three particulate removal options separately or in combination will be considered: cyclones, electrostatic precipitators, and baghouses.

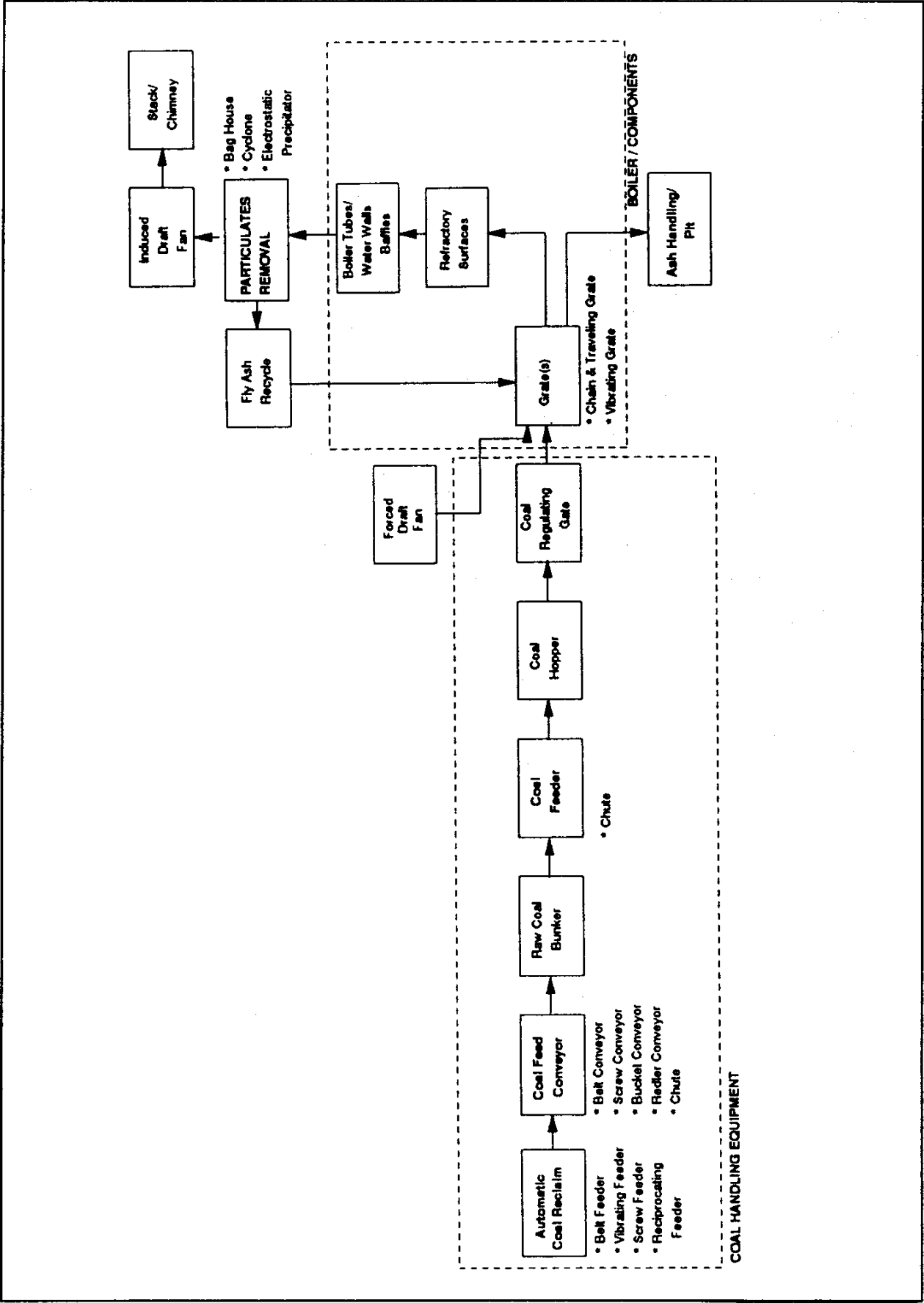


Figure 1-3. Overfeed stoker-fired boiler system components block flow diagram.

The next subsystem identified in the block flow diagram is the fan subsystem. Overfeed stoker-fired boiler systems use a number of fans to move air and flue gas. The major fan types addressed in the Guide include:

- forced draft (FD) fans, which supply undergrate air
- induced draft (ID) fans, which withdraw flue gas from the furnace and balance furnace pressure.

All the fans can be impacted by changes in coal quality. The final subsystems addressed in the Guide include those components equipped to handle ash. Specific components include the chimney/stack and the ash hopper/pit.

A3 Troubleshooting Logic

The component/symptom Guide table (Figure 1-4) serves to identify:

- Typical symptoms (problems) that may be encountered in underfeed stoker-fired boiler systems. These symptoms are arranged horizontally along the top of the table
- The various components shown in the block flow diagram affected by these symptoms. These components are listed down the left hand side of the table in the same logical fashion as they are arranged in the block flow diagram
- The logic diagrams.

The remainder of this Appendix consists of 92 logic diagrams, arranged by component and by all the symptoms that can affect that component.

COMPONENT		SYMPTOM															
		EXCESS WEAR	PLUGGAGE	INSUFFICIENT CAPACITY	ERRATIC FEEDING	CORROSION	SEGREGATION	PRESSURE DROP	UNEVEN ASH BED	UNEVEN COAL BED	WARPED BURNING	CLUNKERS	CARBON BURNOUT	REDUCED EFFICIENCY	SMOKING	EROSION	SLAGGING/SPALLING
COAL HANDLING EQUIPMENT																	
Automatic Coal Reclaim																	
1) Belt Feeder		1-5	1-6	1-7	1-8												
2) Vibrating Feeder		1-9	1-10	1-11	1-12												
3) Screw Feeder		1-13	1-14	1-15	1-16												
4) Reciprocating Feeder		1-17	1-18	1-19	1-20												
Coal Feed Conveyor																	
1) Belt Conveyor		1-21	1-22	1-23	1-24												
2) Screw Conveyor		1-25	1-26	1-27	1-28												
3) Bucket Conveyor		1-29	1-30	1-31	1-32												
4) Redler Conveyor		1-33	1-34	1-35	1-36												
5) Chute		1-37	1-38	1-39													

Figure 1-4. Overfeed stoker—component/symptom guide (part 1).

COMPONENT		SYMPTOM															
		EXCESS WEAR	PLUGGAGE	INSUFFICIENT CAPACITY	ERRATIC FEEDING	CORROSION	SEGREGATION	PRESSURE DROP	UNEVEN ASH BED	UNEVEN COAL BED	WARPED BURNING	CLUNKERS	CARBON BURNOUT	REDUCED EFFICIENCY	SMOKING	EROSION	SLAGGING/SPALLING
COAL HANDLING EQUIP.(CONT'D)																	
Coal Feeders																	
Chute		1-40	1-41	1-42													
Coal Bunker		1-43	1-44	1-45													
Coal Hopper		1-46	1-47	1-48													
Coal Regulating Gate		1-49	1-50	1-51	1-52												
BOILER / COMPONENTS																	
Boiler		1-53										1-54					
1) Grates	Chain & Traveling or Vibrating grate			1-55	1-56	1-57	1-58	1-59	1-60	1-61	1-62	1-63					
2) Refractory Surfaces				1-64									1-65	1-66			
3) Boiler Tubes/Water Walls				1-67									1-68	1-69	1-70		
4) Baffles				1-71									1-72	1-73	1-74		

Figure 1-4. Overfeed stoker—component/symptom guide (part 2).

COMPONENT	SYMPTOM															
	EXCESS WEAR	PLUGGAGE	INSUFFICIENT CAPACITY	ERRATIC FEEDING	CORROSION	SEGREGATION	PRESSURE DROP	UNEVEN ASH BED	UNEVEN COAL BED	WARPED, BURNT, CRACKED	CLUNKERS	CARBON BURNOUT	REDUCED EFFICIENCY	SMOKING	EROSION	SLAGGING/SPALLING
FANS																
1) Forced Draft		1-75									1-76					
2) Induced Draft		1-77	1-78								1-79	1-80				
PARTICULATE REMOVAL																
1) Baghouse										1-81					1-82	
2) Cyclone										1-83	1-84		1-85			
3) Electrostatic Precipitator										1-86	1-87		1-88			
ASH HANDLING																
1) Fly Ash Recycle										1-89						
2) Ash Hopper/Pit									1-90	1-91						
Stack/Chimney			1-92						1-93	1-94				1-95	1-96	

Figure 1-4. Overfeed stoker—component/symptom guide (part 3).

FIGURE 1-5: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear Of The Automatic Coal Reclaim
(Belt Feeder)

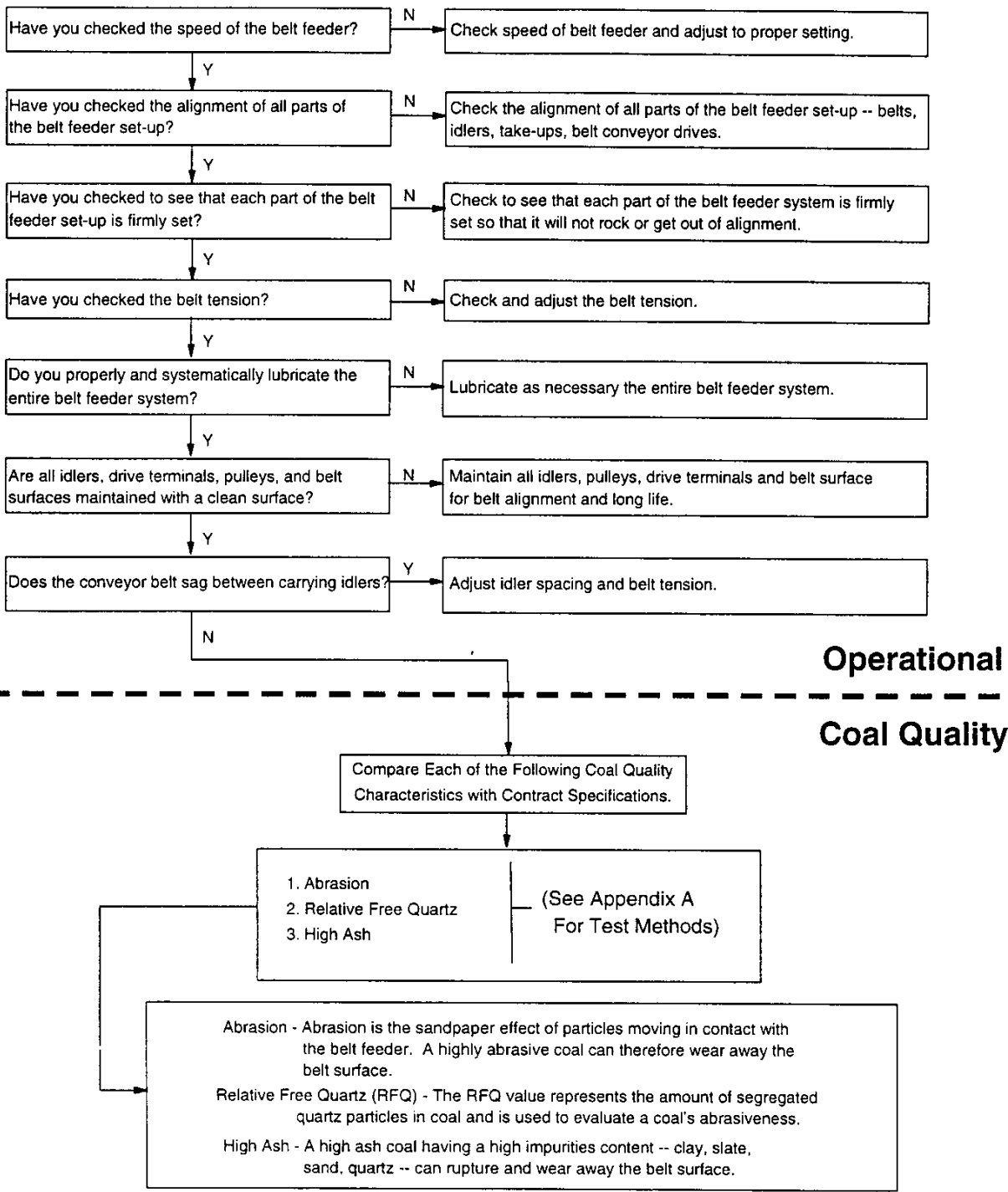


Fig 1-5n/1

FIGURE 1-6: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Automatic Coal Reclaim
(Belt Feeder)

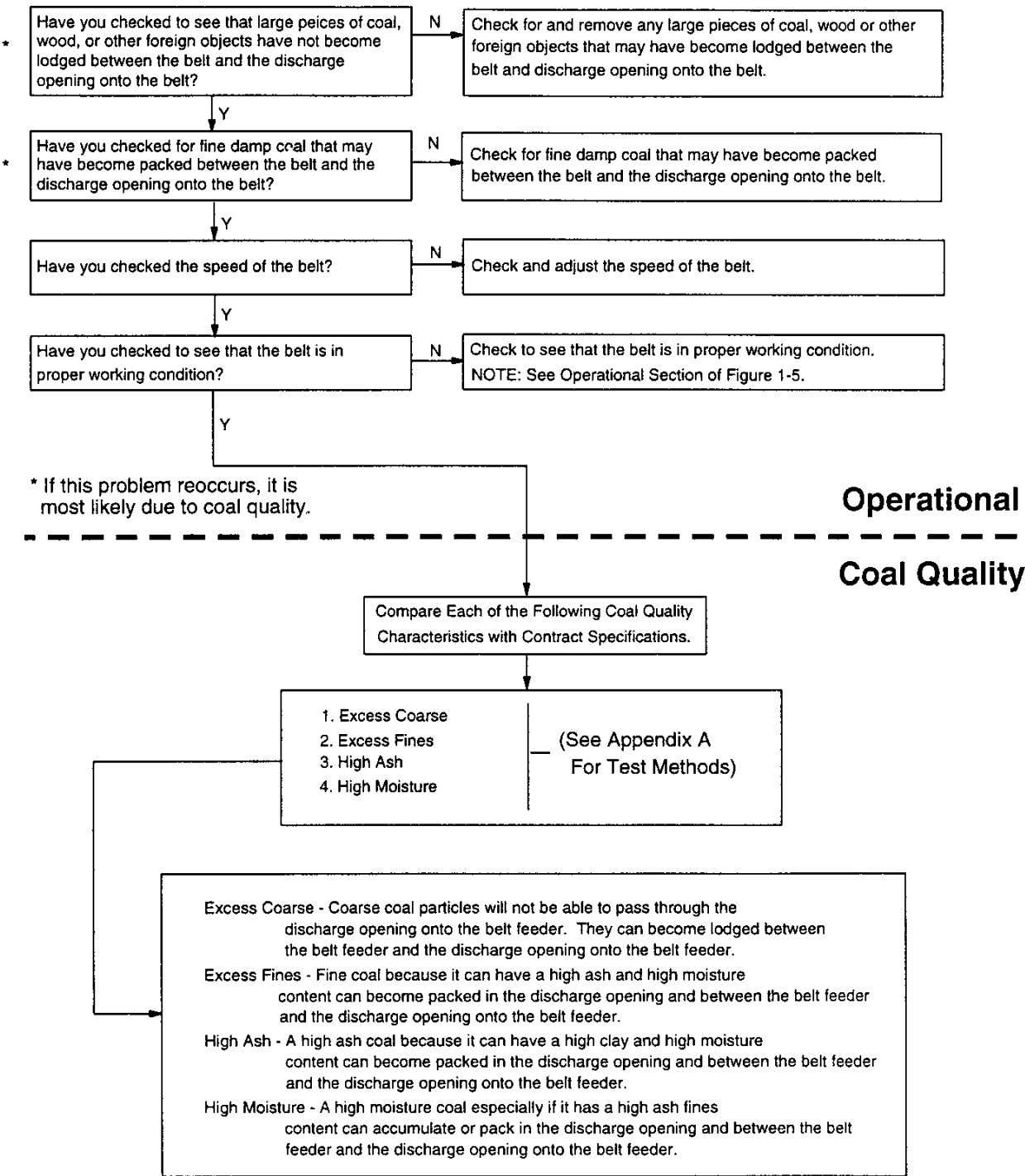


FIG1-6n/1

FIGURE 1-7: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Automatic Coal Reclaim
(Belt Feeder)

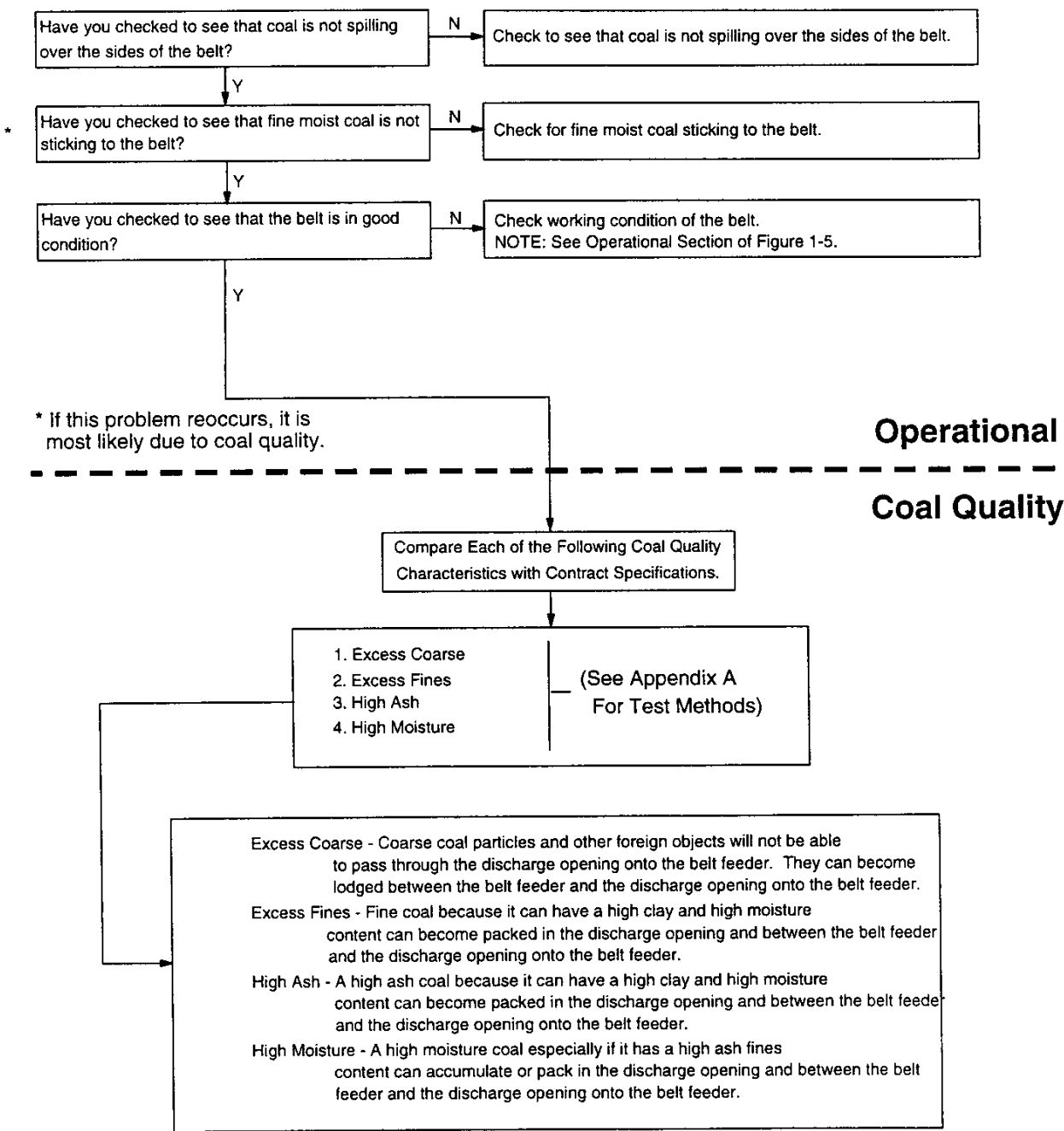


FIG 1-7n/1

FIGURE 1-8: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Automatic Coal Reclaim
(Belt Feeder)

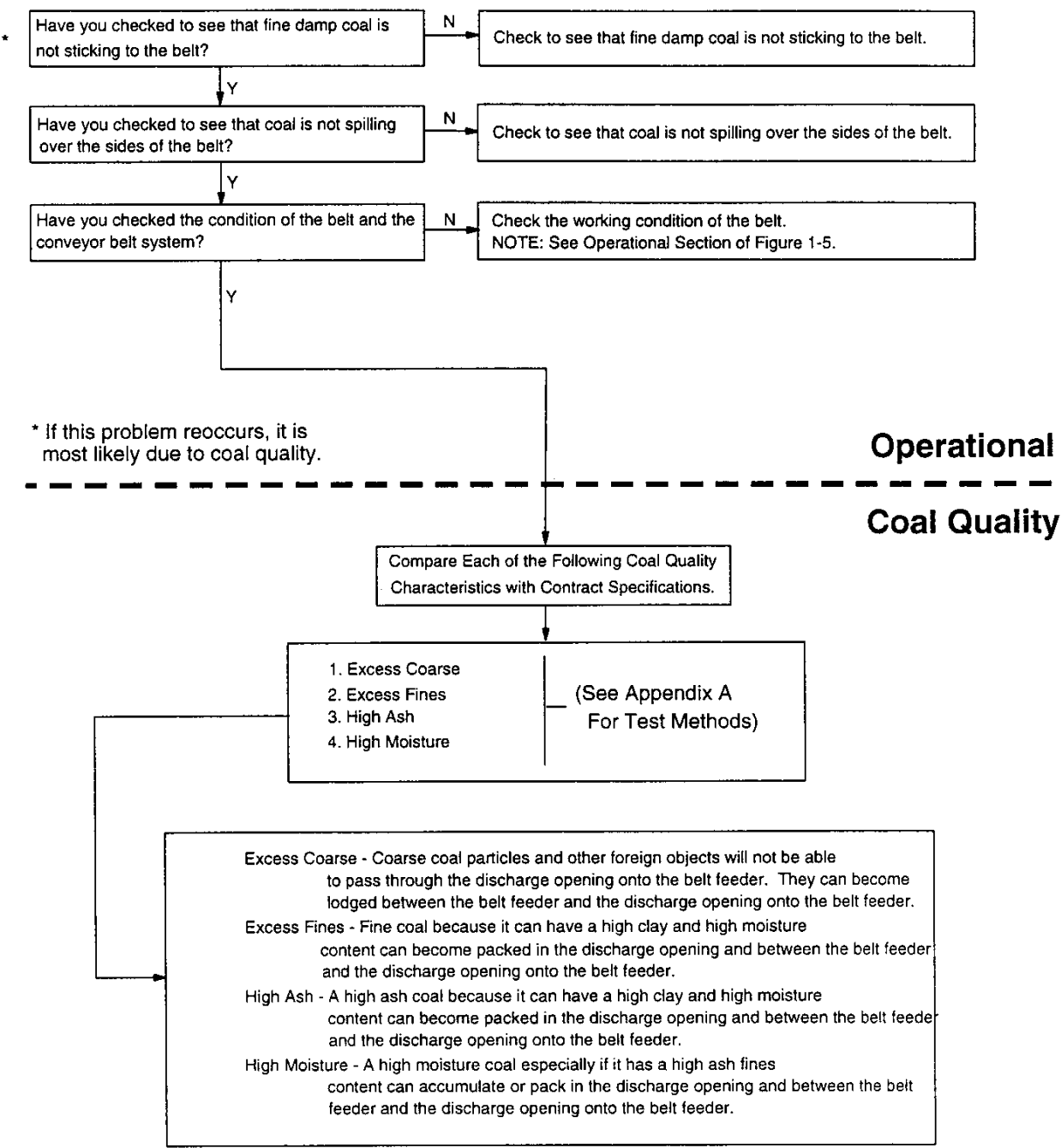


FIG1-8n/1

FIGURE 1-9: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear Of The Automatic Coal Reclaim
(Vibrating Feeder)

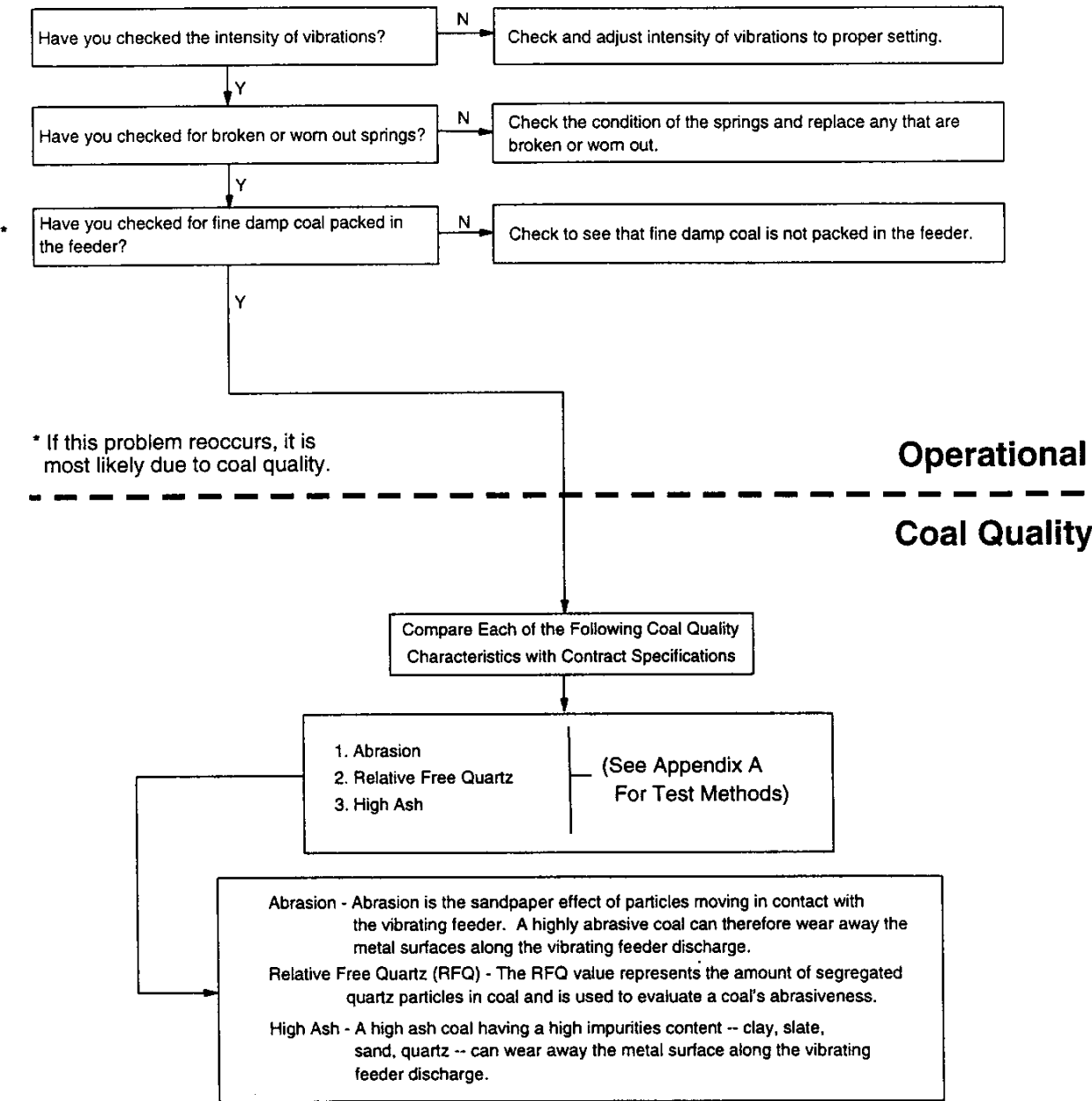


FIG1-9n/1

FIGURE 1-10: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Automatic Coal Reclaim
(Vibrating Feeder)

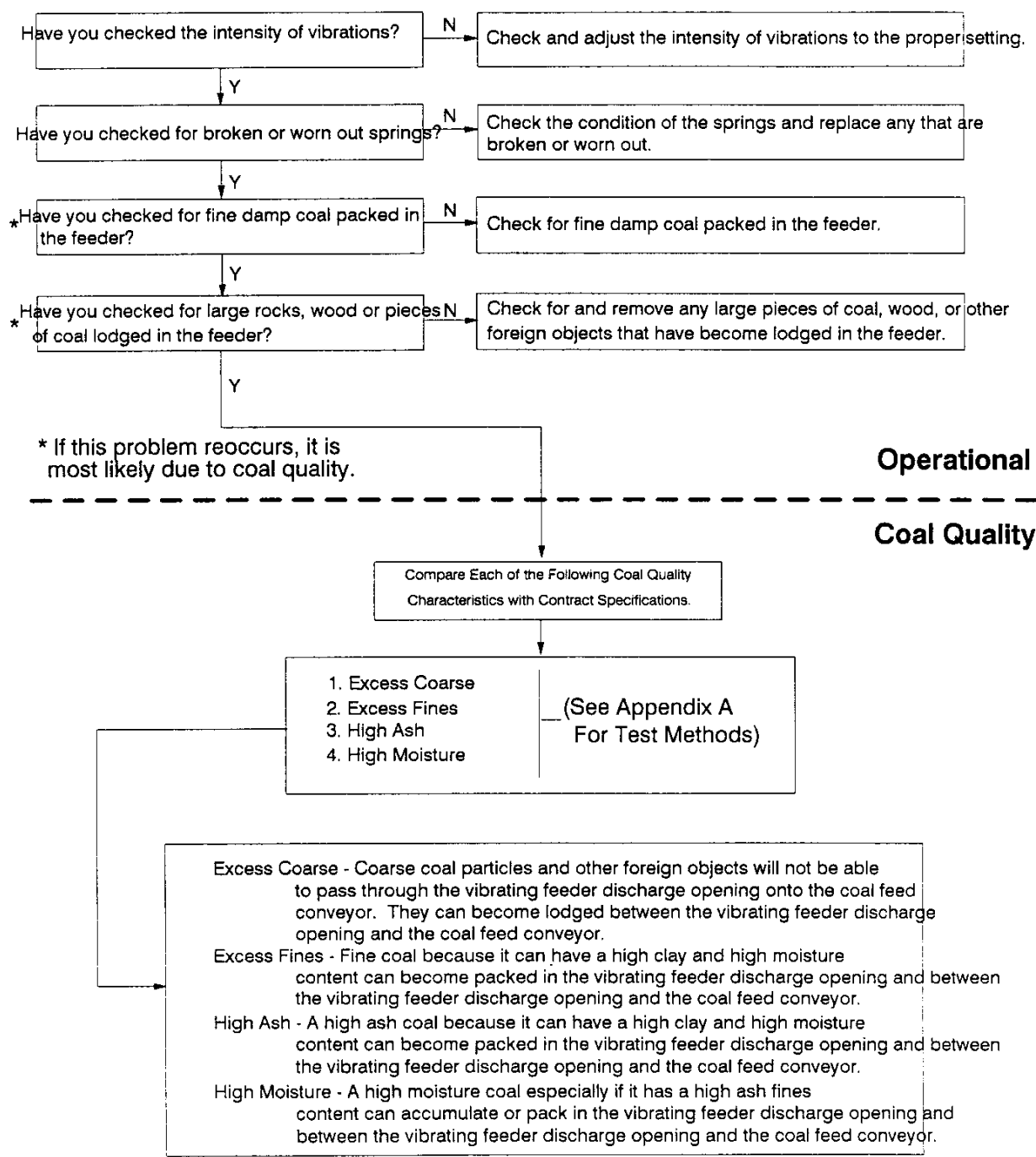


FIGURE 1-11: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Automatic Coal Reclaim
(Vibrating Feeder)

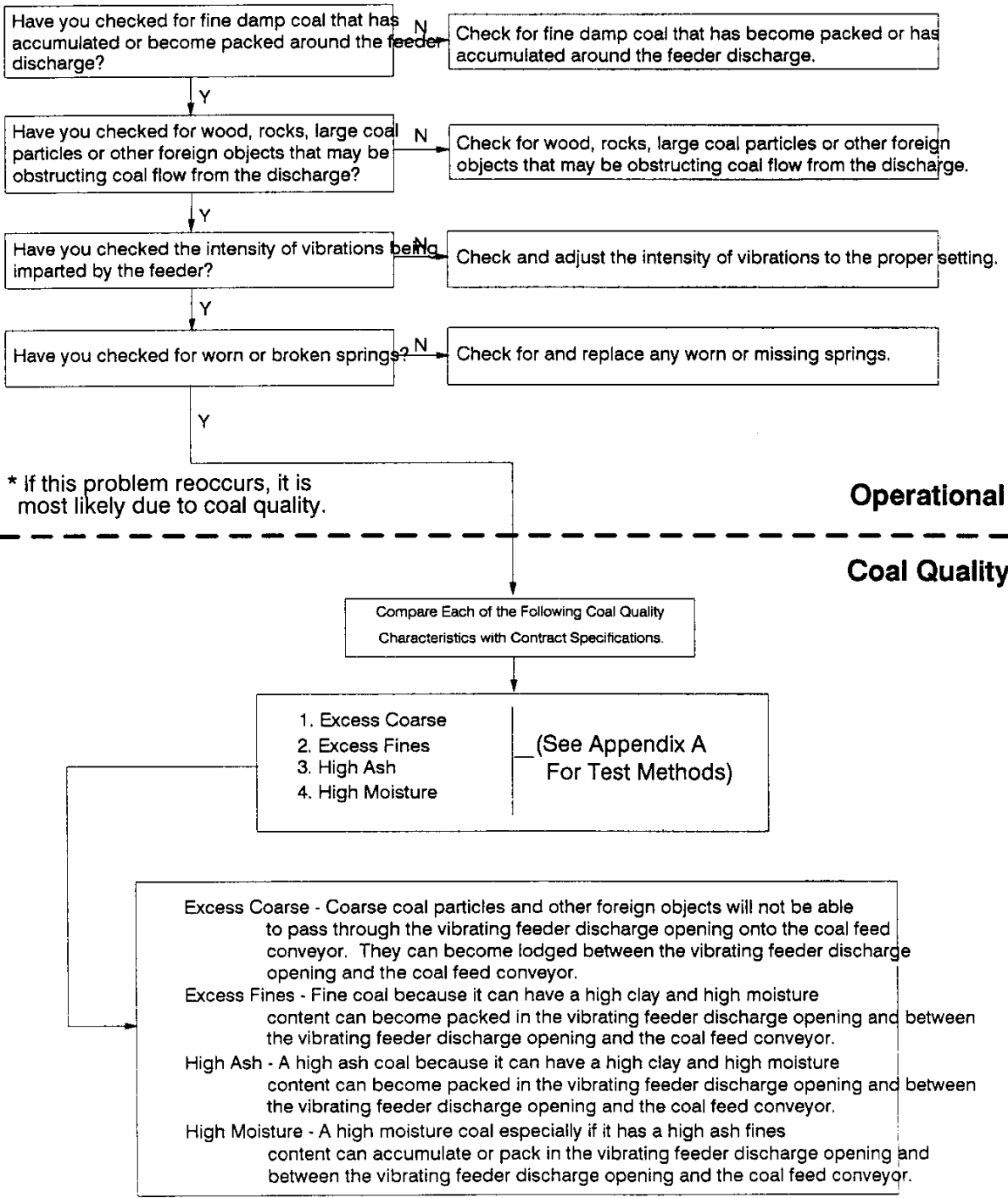


FIG1-11n/1

FIGURE 1-12: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Automatic Coal Reclaim
(Vibrating Feeder)

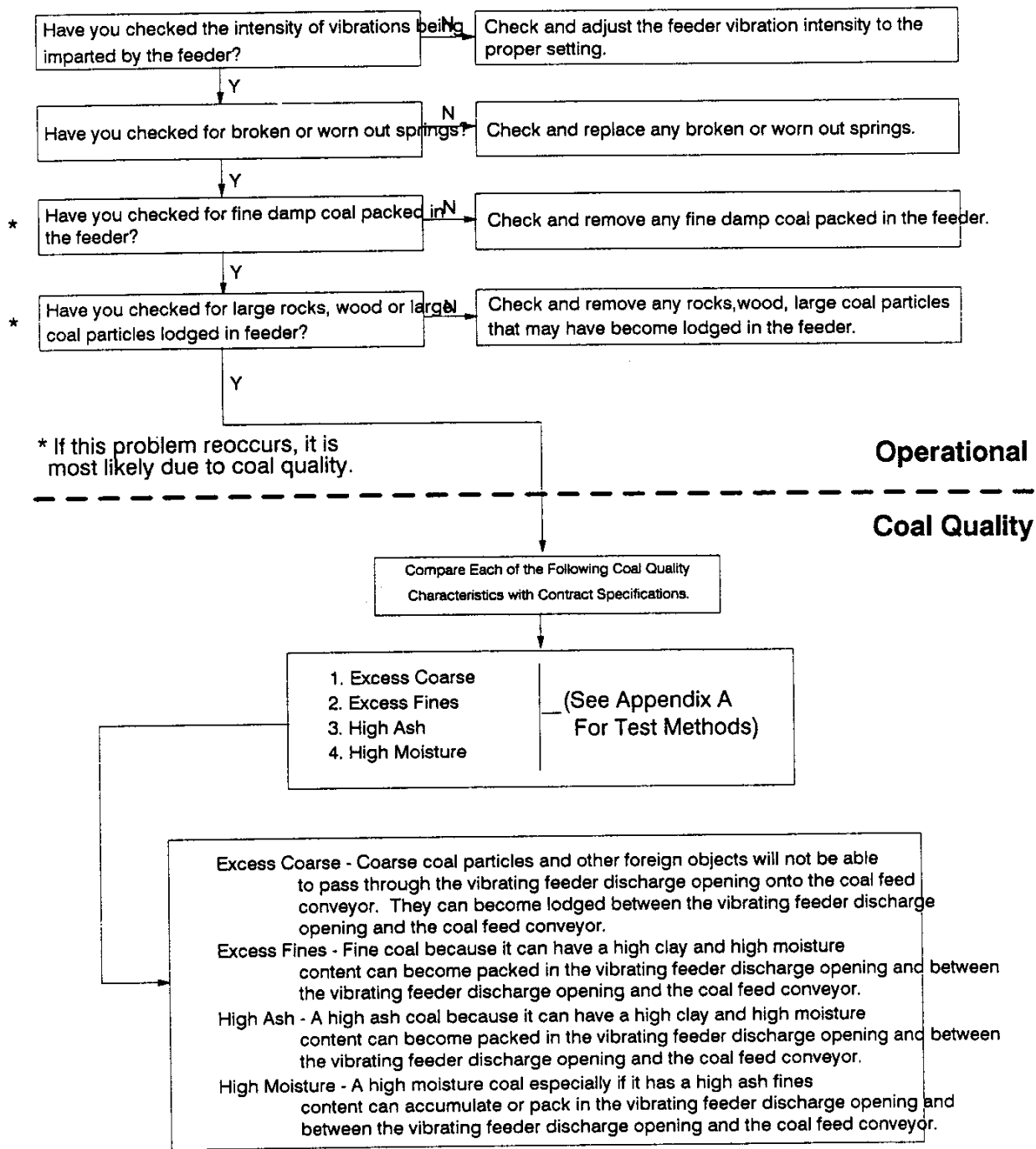


FIG1-12rv1

FIGURE 1-13: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear Of The Automatic Coal Reclaim
(Screw Feeder)

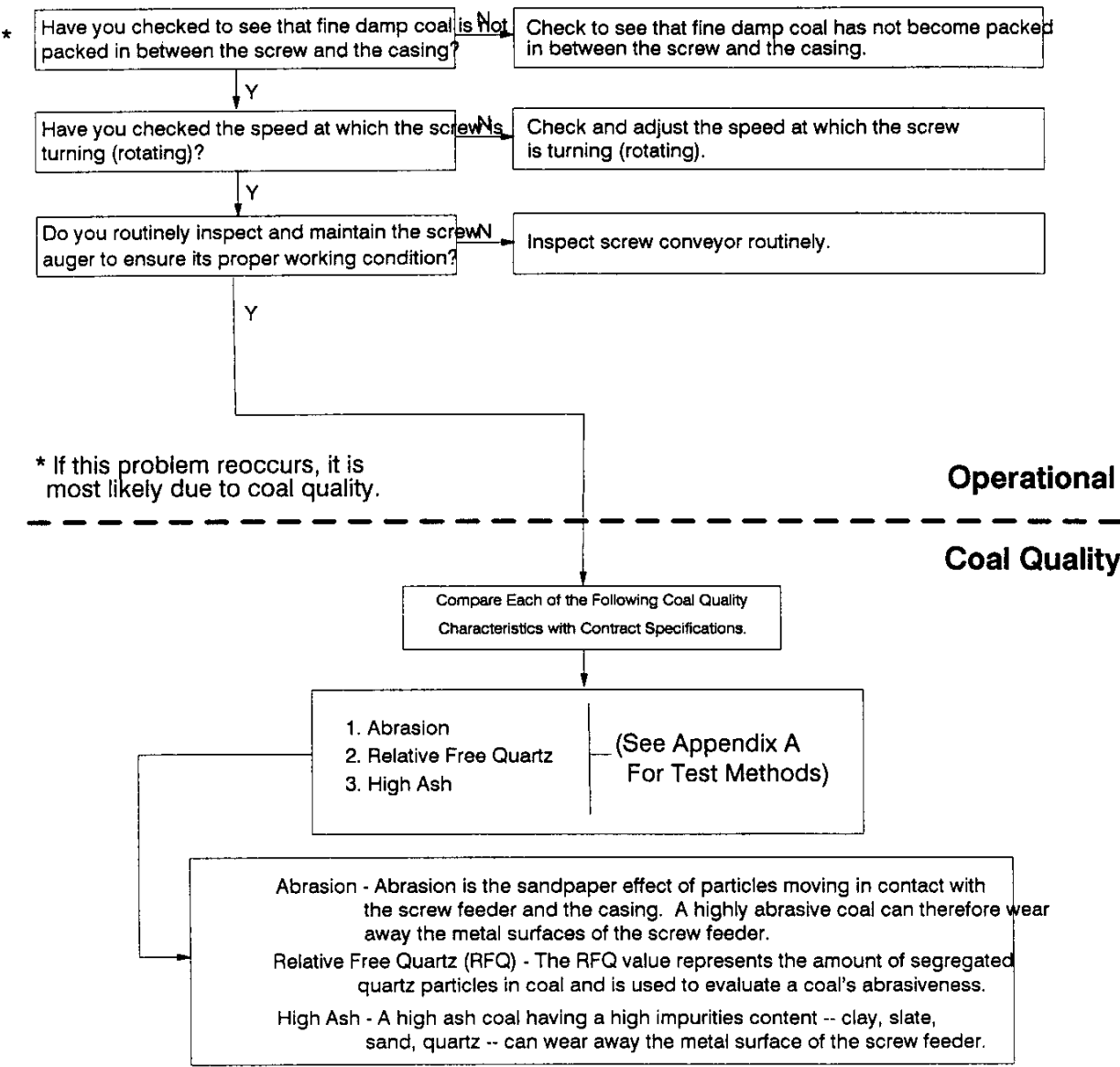


FIG1-13n/1

FIGURE 1-14: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Automatic Coal Reclaim
(Screw Feeder)

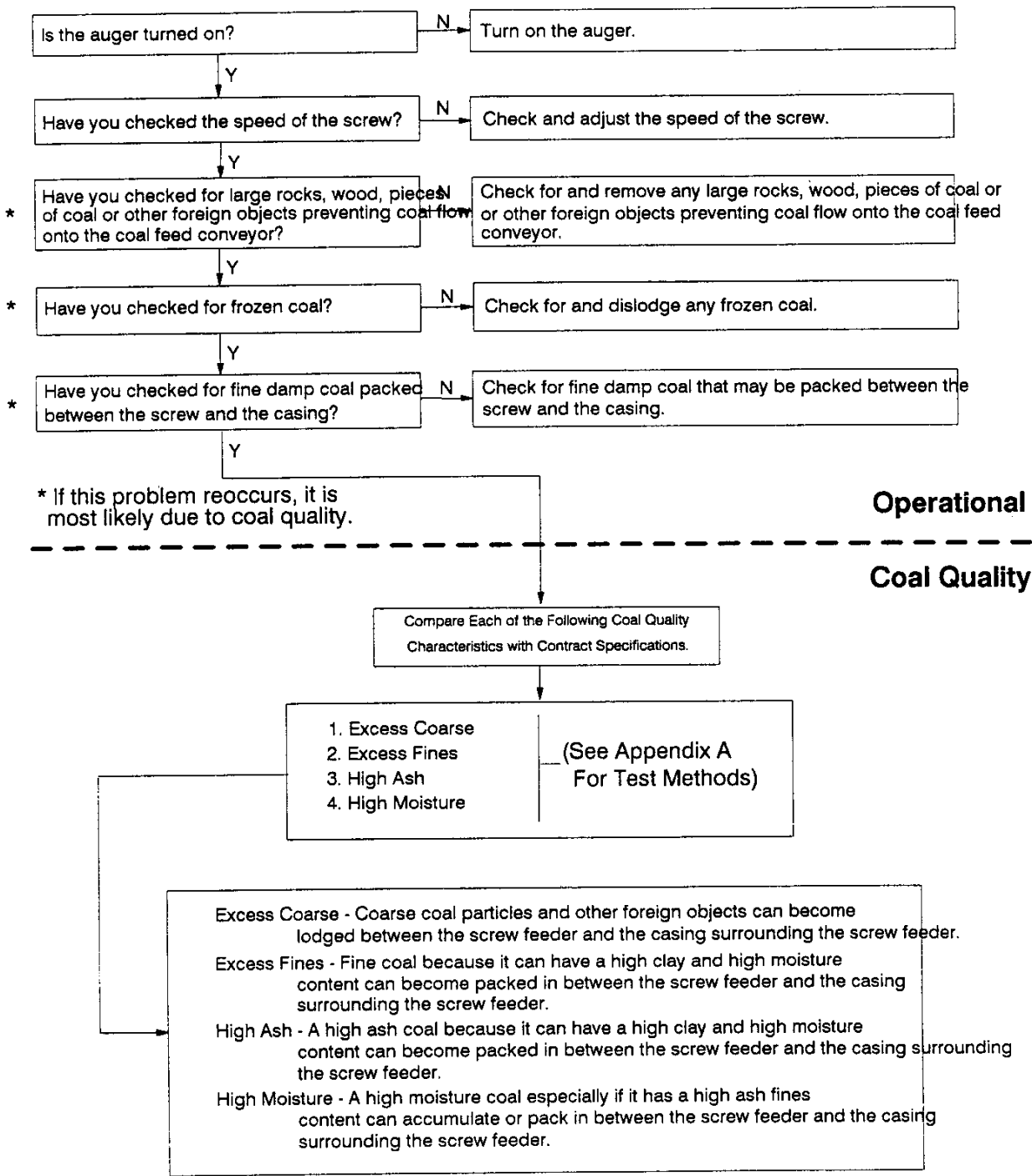


FIG1-14a/1

FIGURE 1-15: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Automatic Coal Reclaim
(Screw Feeder)

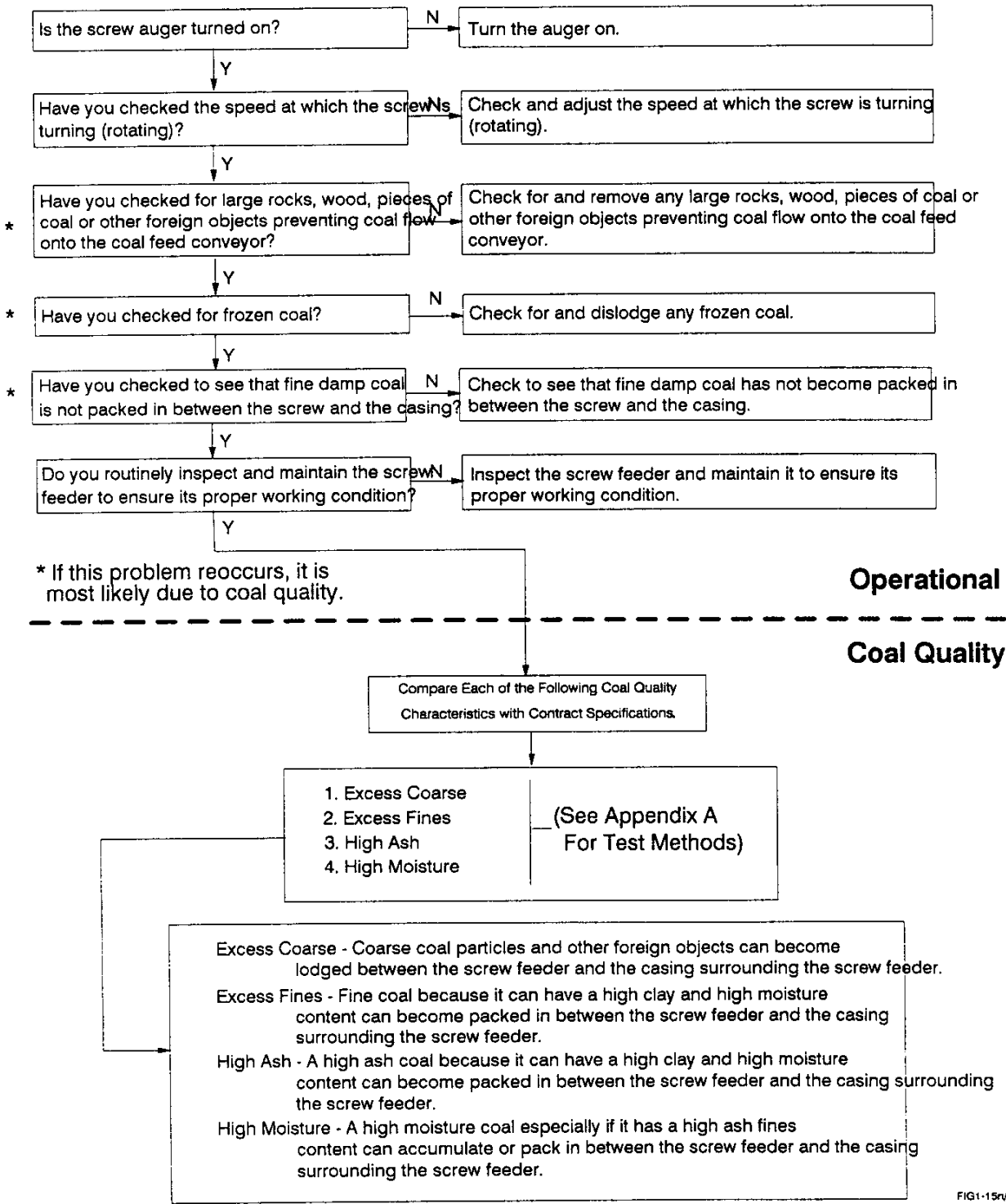


FIG1-15v1

FIGURE 1-16: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feed From The Automatic Coal Reclaim
(Screw Feeder)

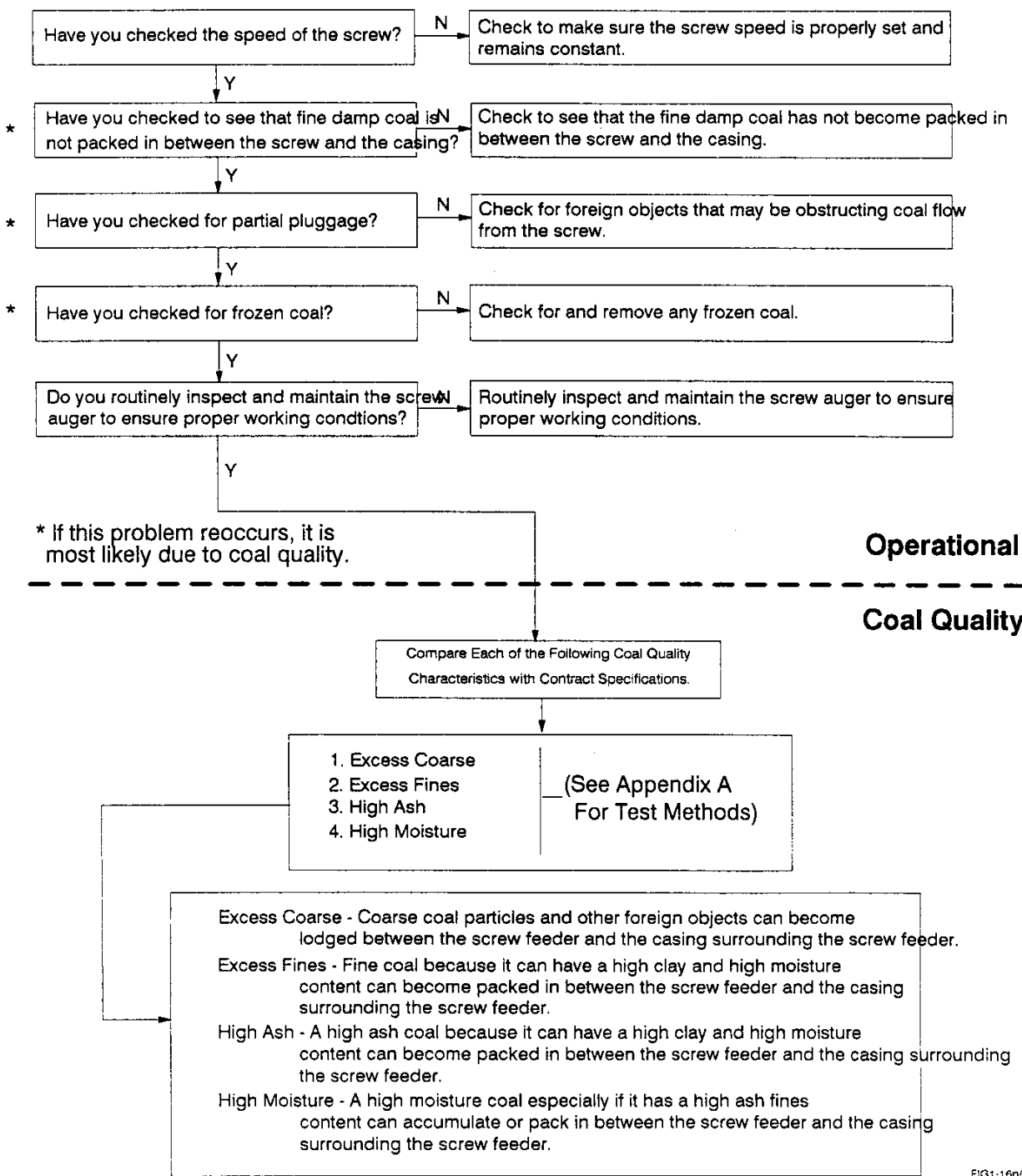


FIGURE 1-17: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear Of The Automatic Coal Reclaim
(Reciprocating Feeder)

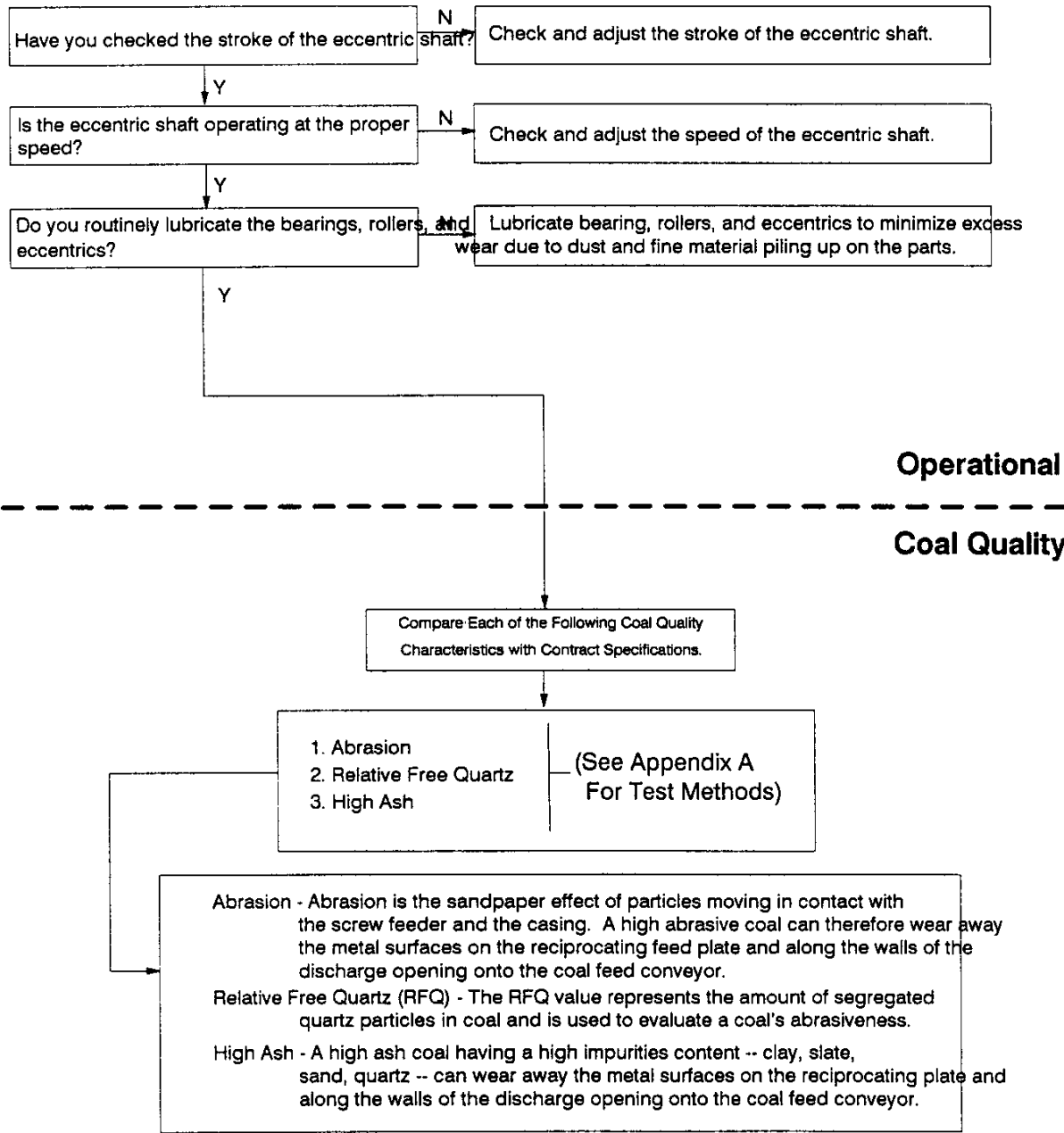


FIG1-17n/1

FIGURE 1-18: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Automatic Coal Reclaim
(Reciprocating Feeder)

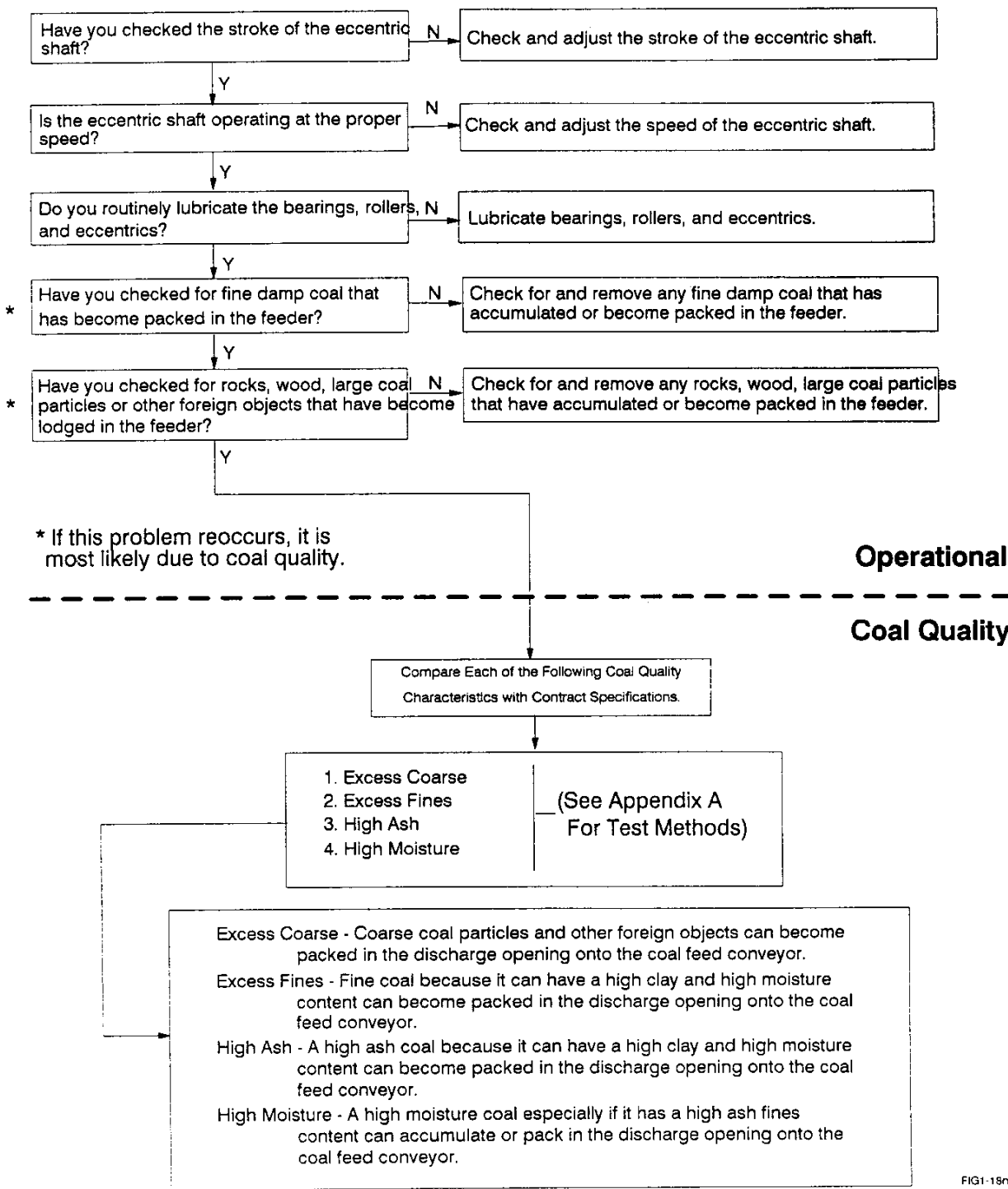


FIG1-18n/1

FIGURE 1-19: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Automatic Coal Reclaim
(Reciprocating Feeder)

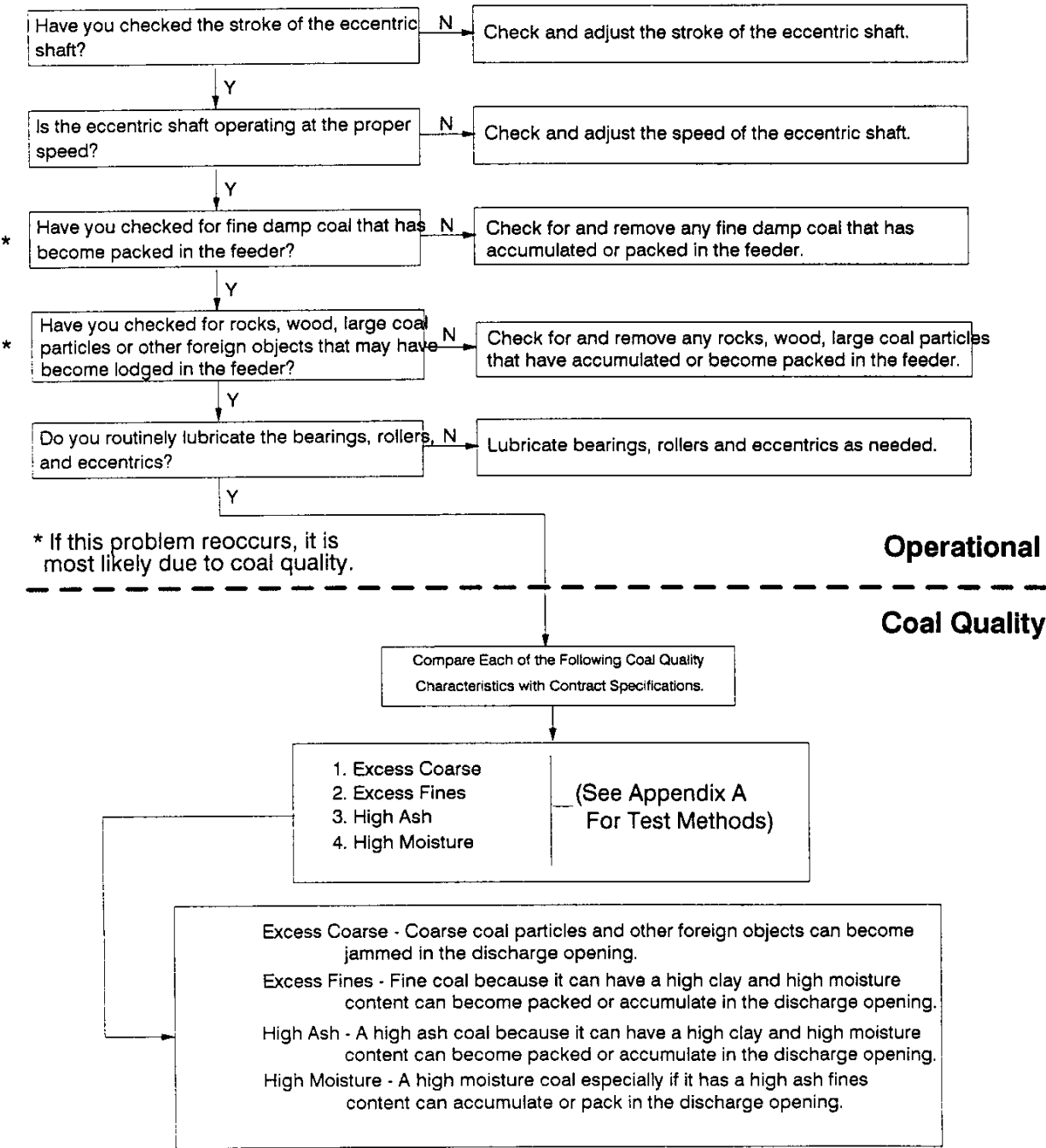


FIG1-19r/1

FIGURE 1-20: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Automatic Coal Reclaim
(Reciprocating Feeder)

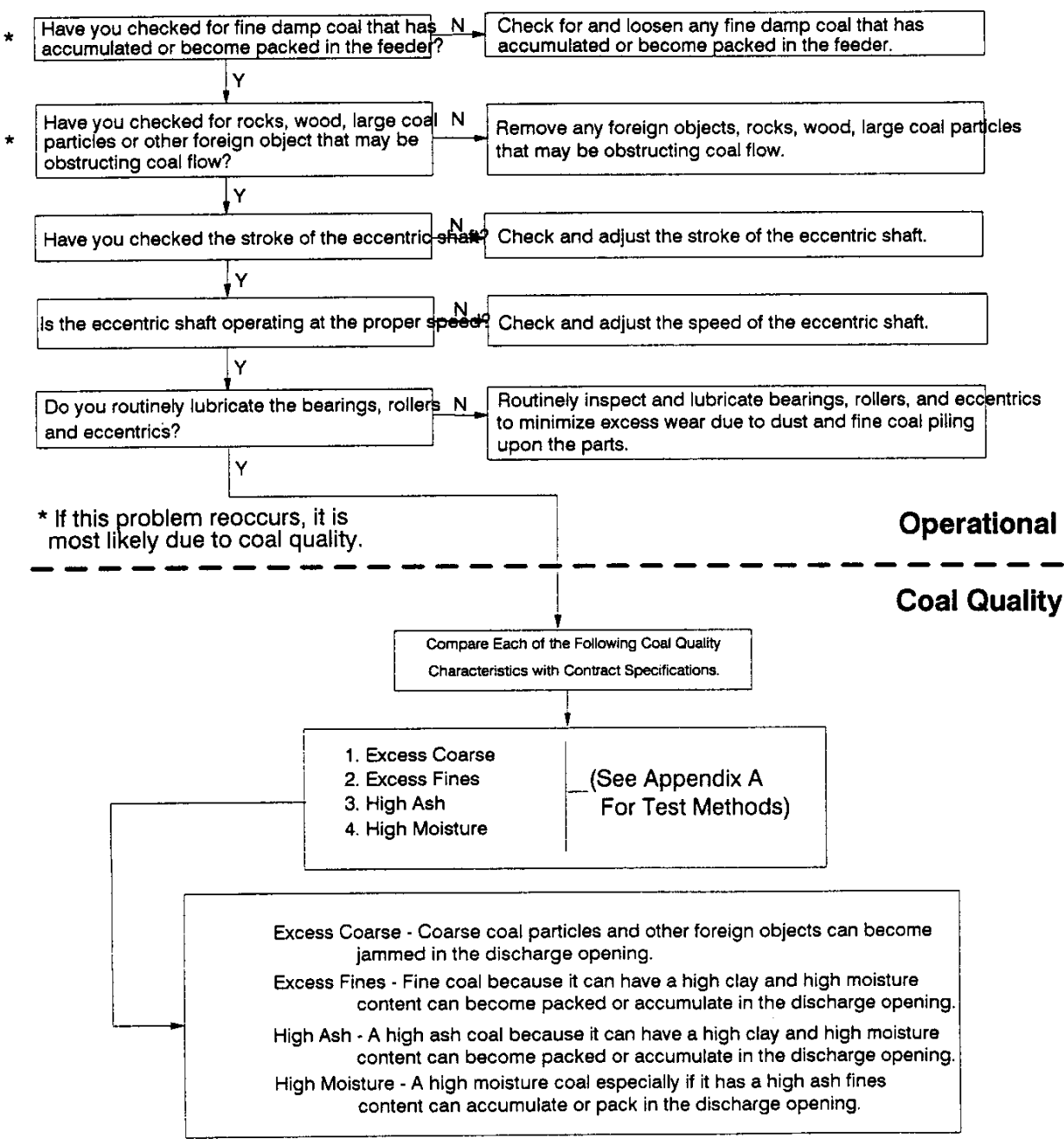


FIG1-20n/1

FIGURE 1-21: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear Of The Coal Feed Conveyor
(Belt Conveyor)

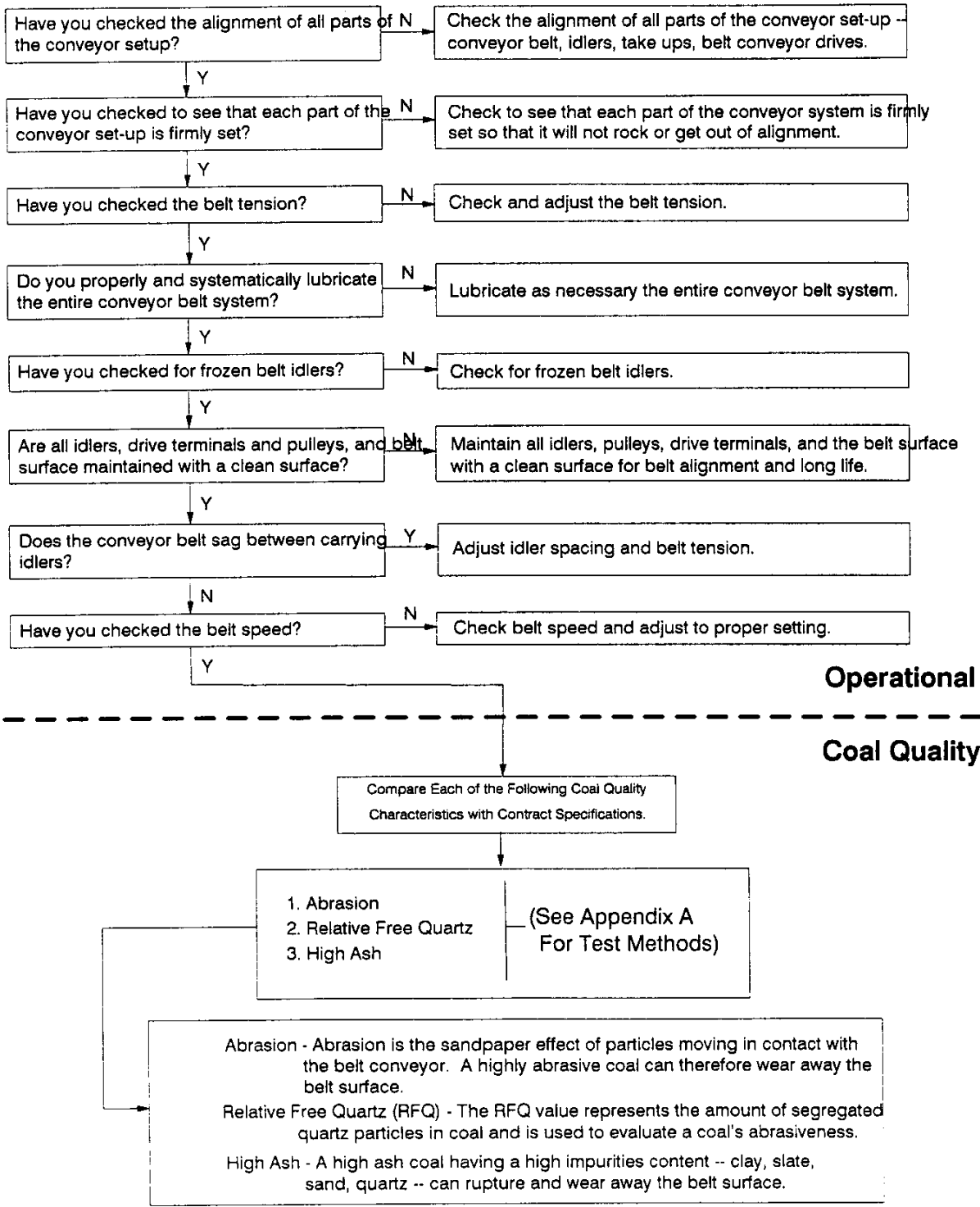


FIG1-21n/1

FIGURE 1-22: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Feed Conveyor
(Belt Conveyor)

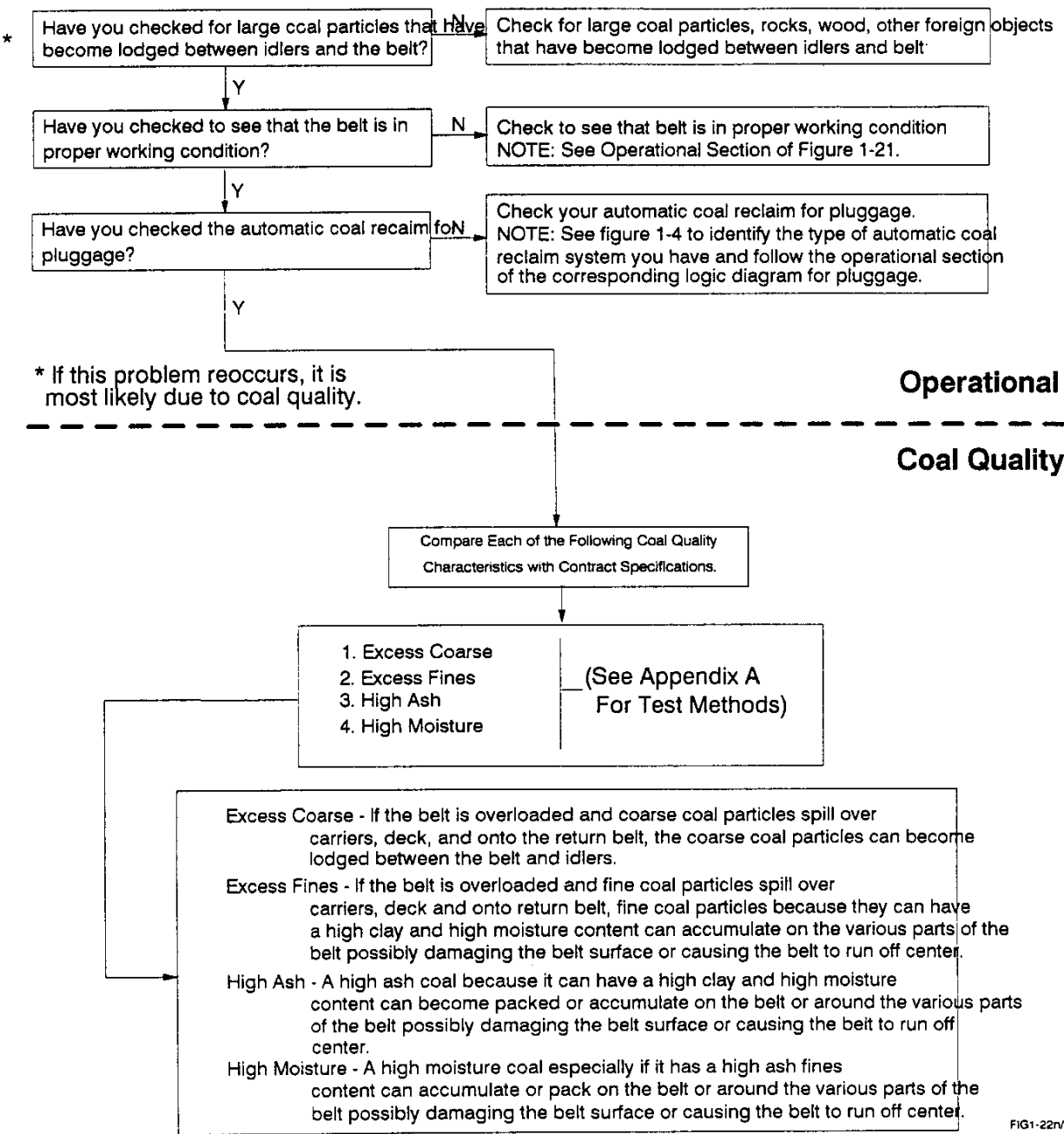


FIG1-22n/1

FIGURE 1-23: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Coal Feed Conveyor
(Belt Conveyor)

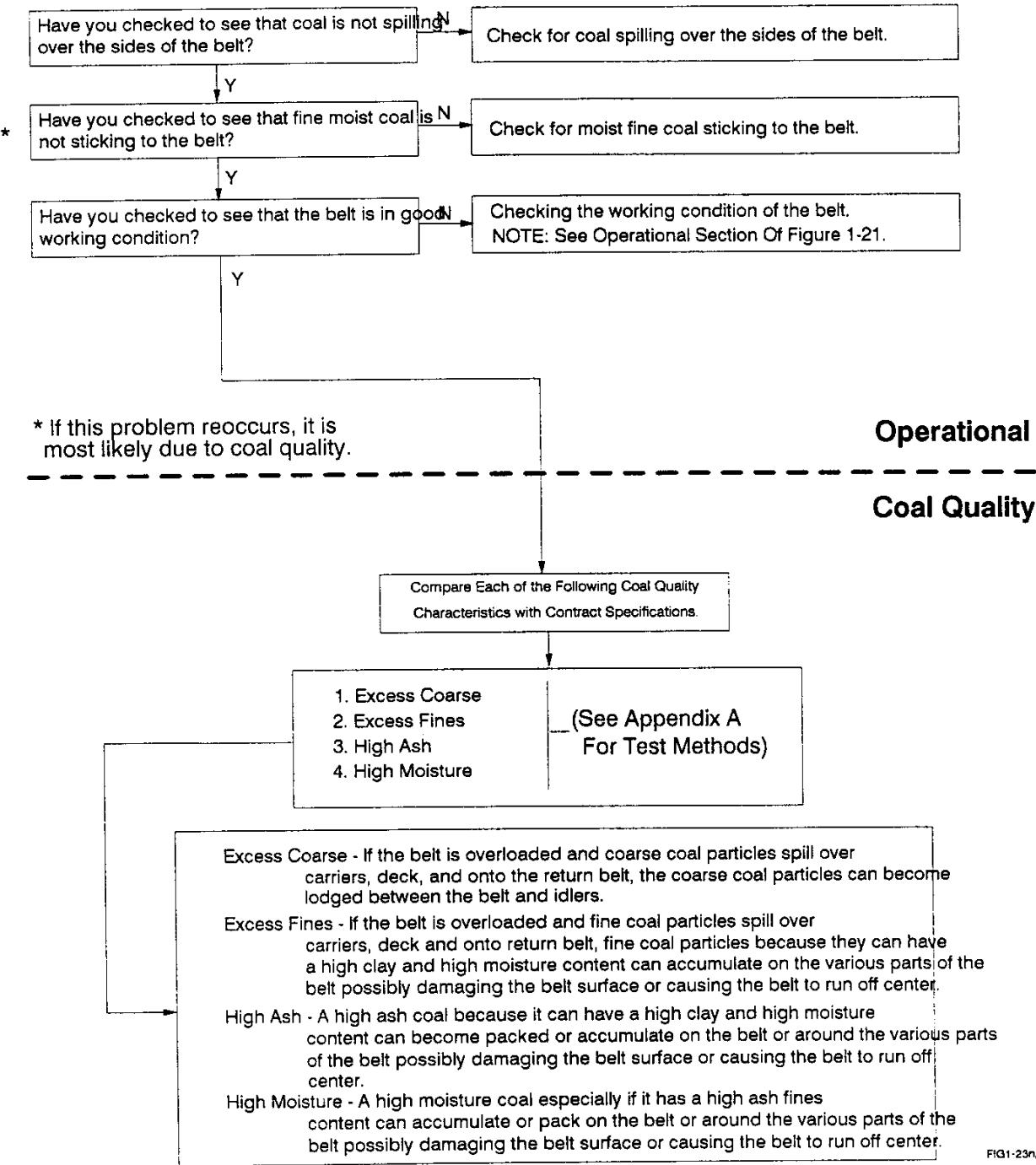


FIG1-23n/1

FIGURE 1-24: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Feed Conveyor
(Belt Conveyor)

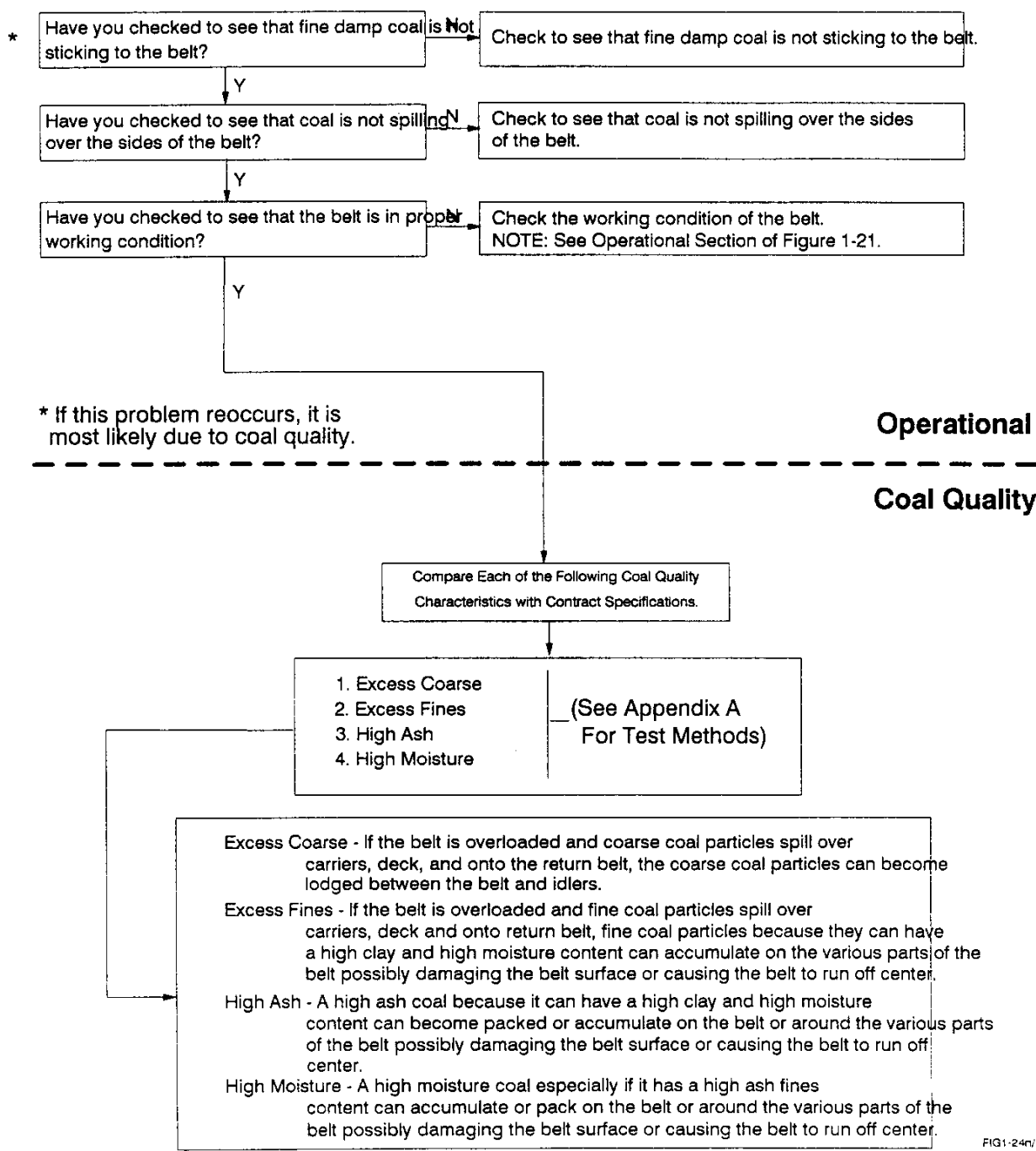


FIGURE 1-25: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
for Excess Wear In The Coal Feed Conveyor
(Screw Conveyor)

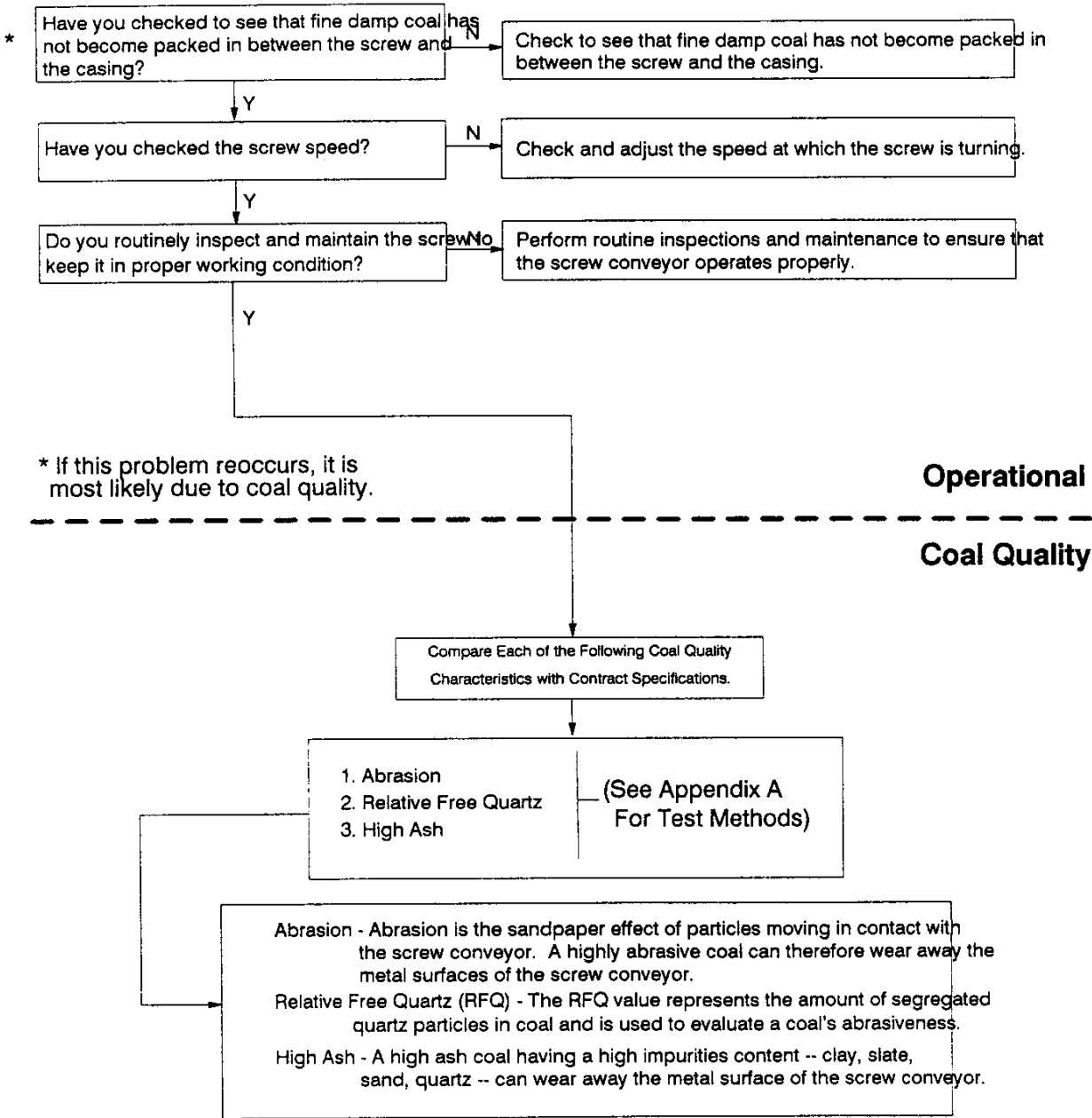


FIG1-25n/1

FIGURE 1-26: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Feed Conveyor
(Screw Conveyor)

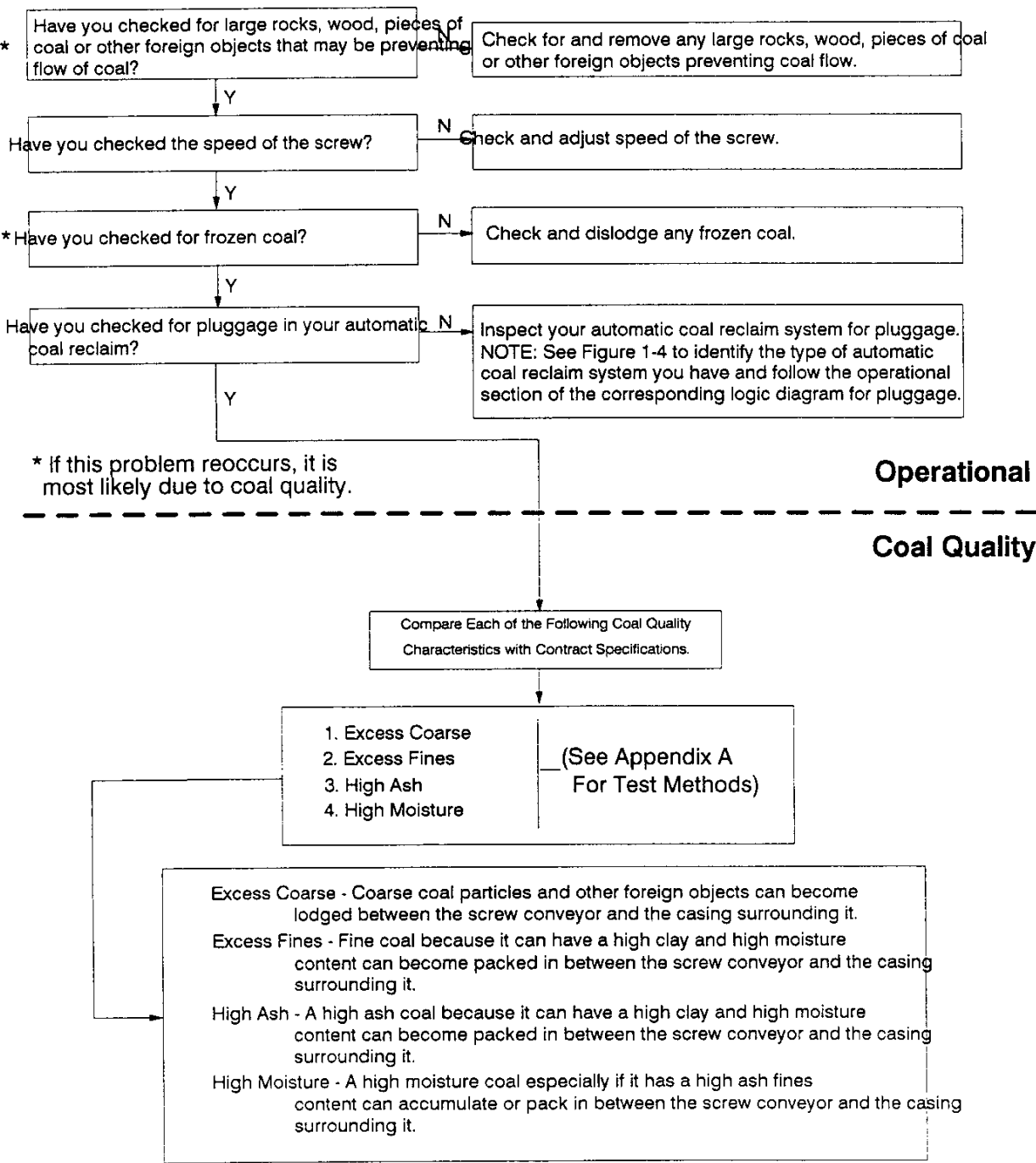


FIGURE 1-27: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Coal Feed Conveyor
(Screw Conveyor)

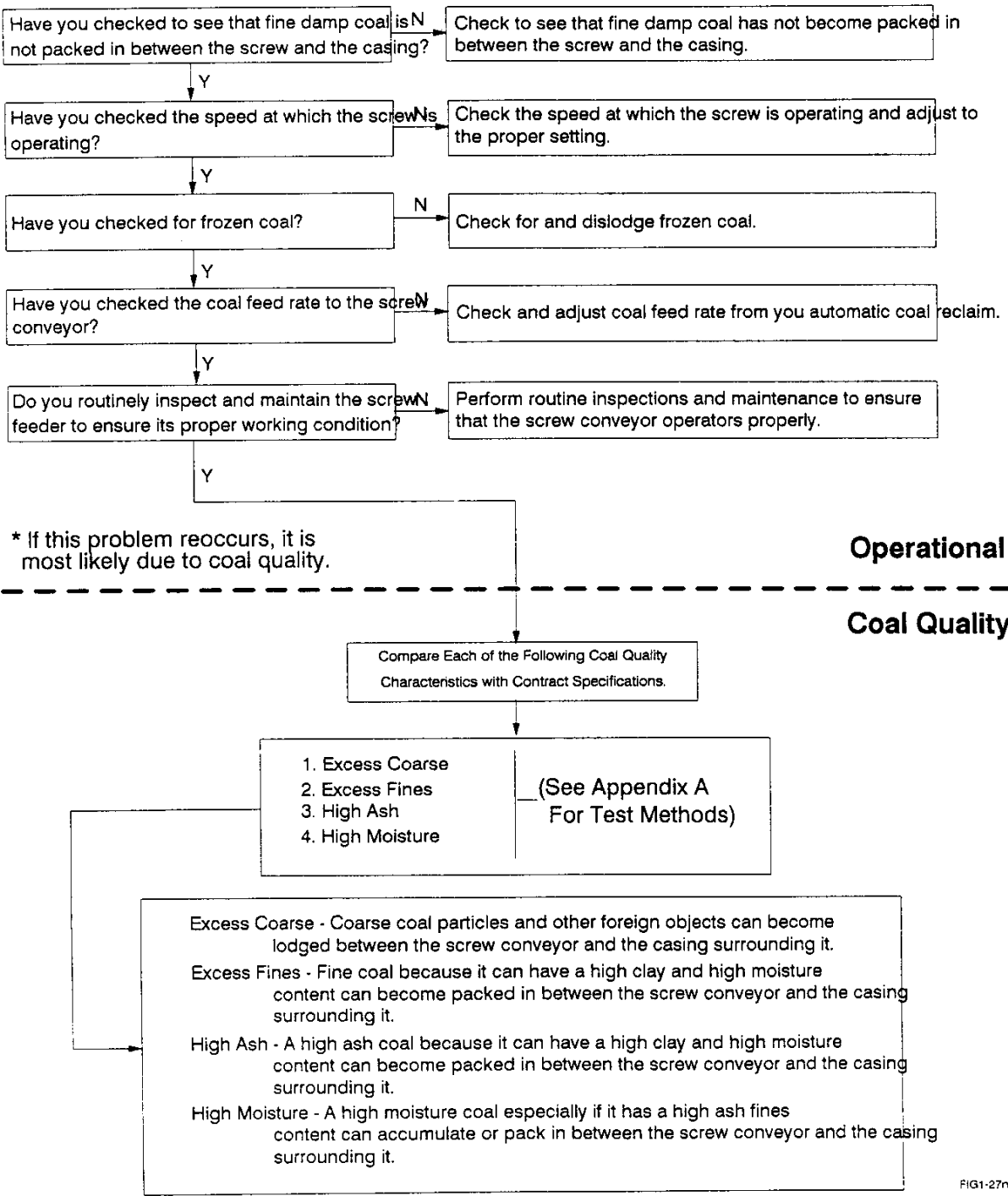


FIG1-27n/1

FIGURE 1-28: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Feed Conveyor
(Screw Conveyor)

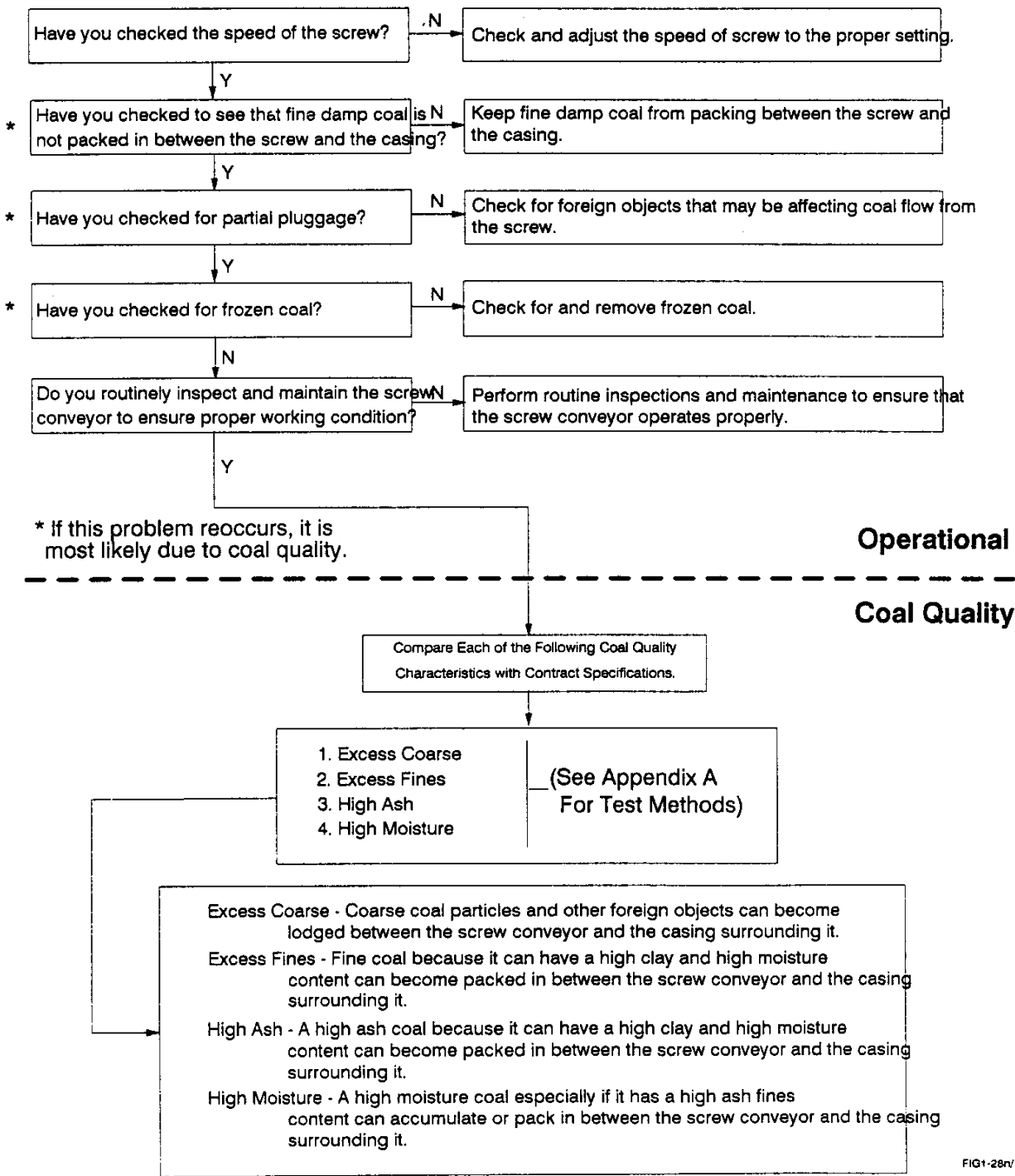


FIG1-28v1

FIGURE 1-29: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear In The Coal Feed Conveyor
(Bucket Conveyor)

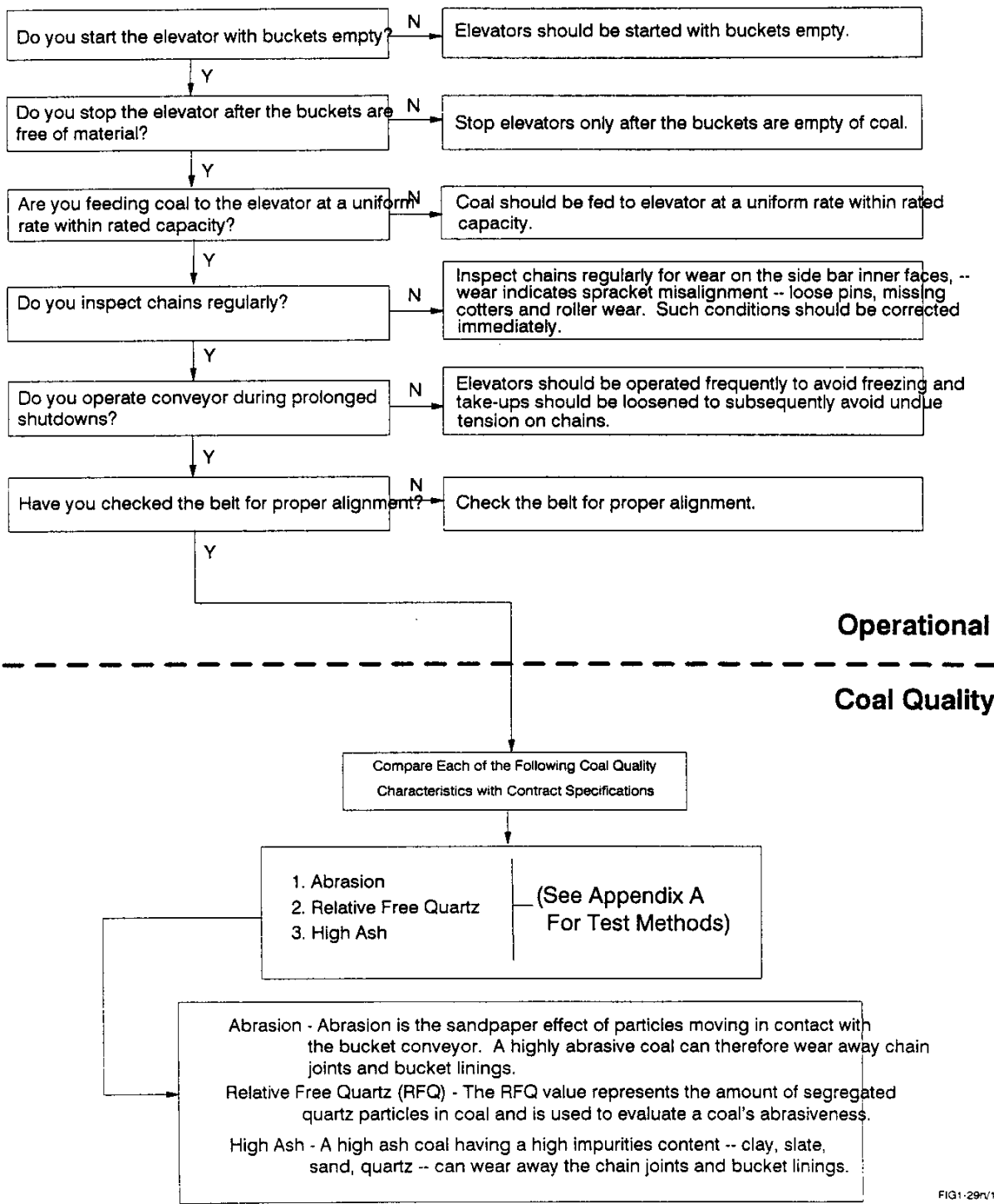


FIG1-29n/1

FIGURE 1-30: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Feed Conveyor
(Bucket Conveyor)

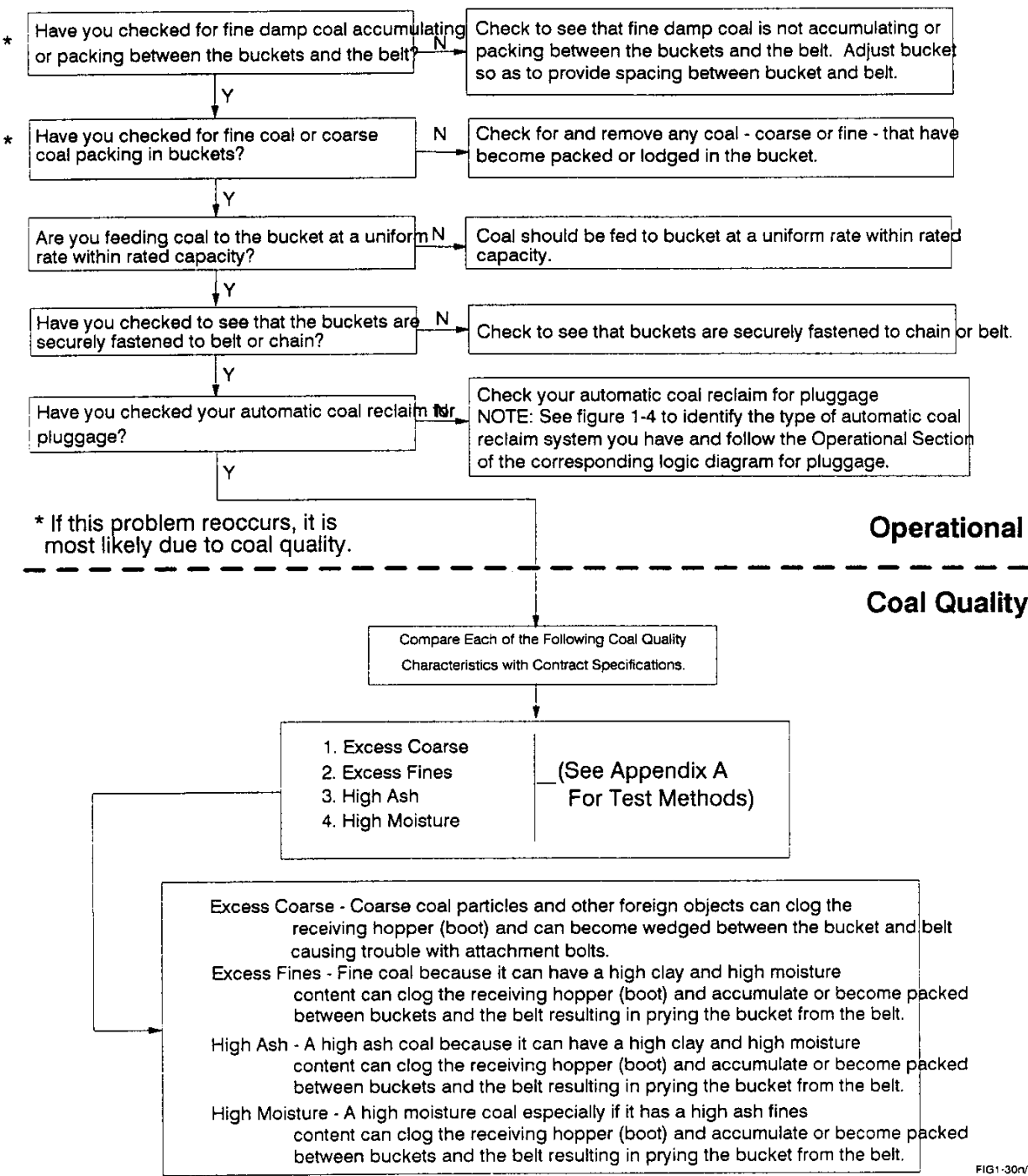


FIG1-30n/1

FIGURE 1-31: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Coal Feed Conveyor
(Bucket Conveyor)

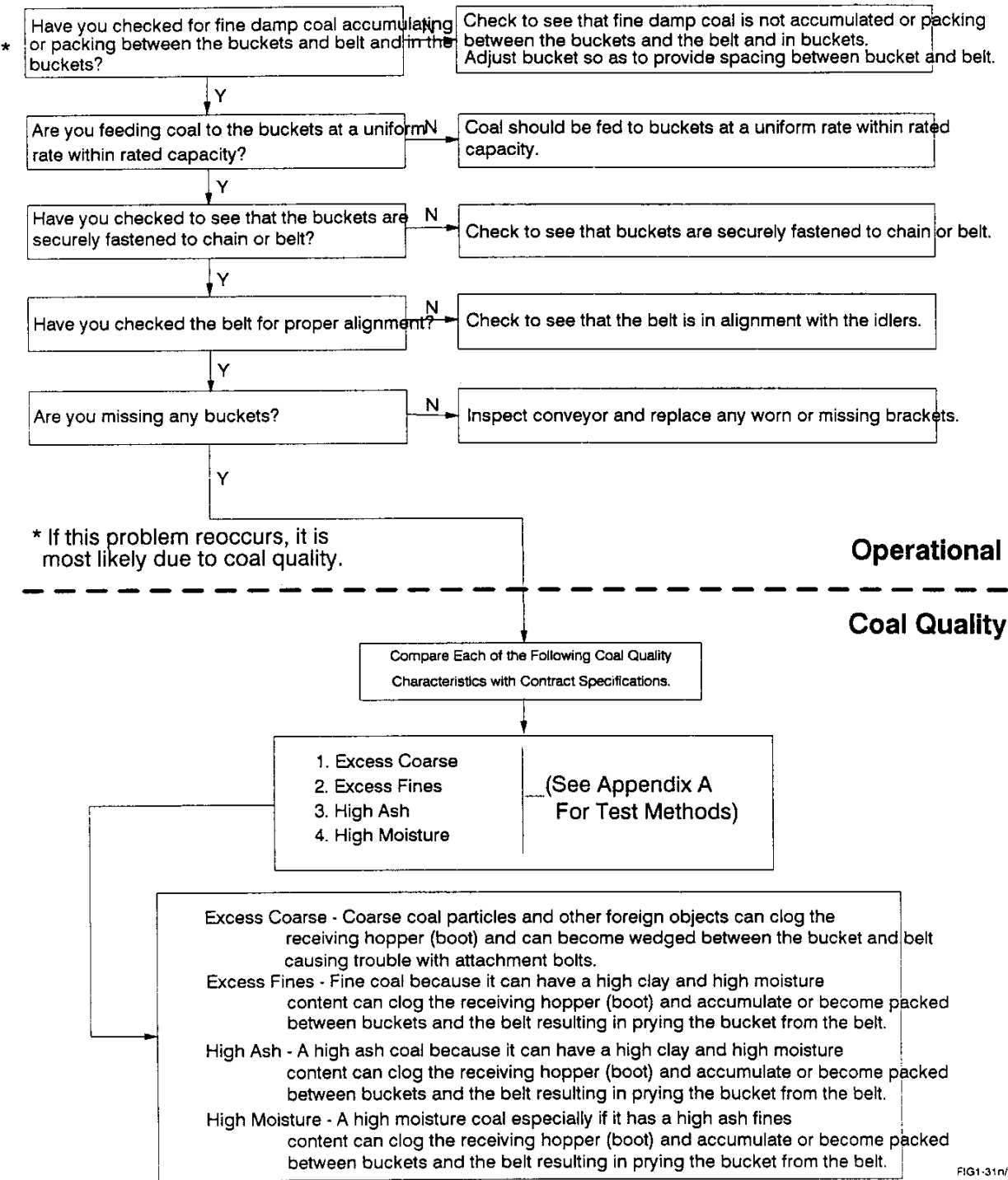


FIGURE 1-32: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
Erratic Feeding From The Coal Feed Conveyor
(Bucket Conveyor)

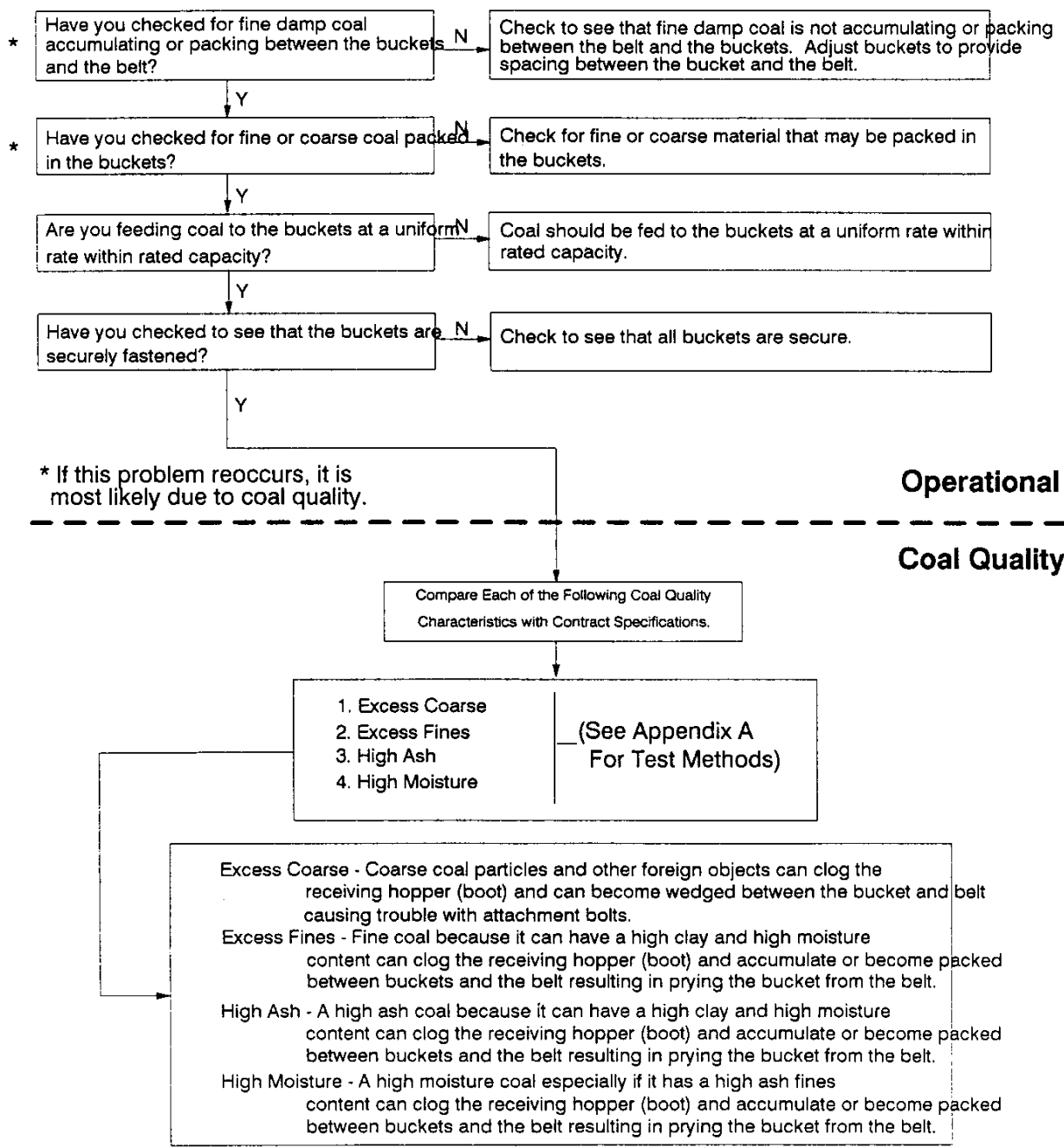


FIG1-32n/1

FIGURE 1-33: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear Of Coal Feed Conveyors
(Redler Conveyors)

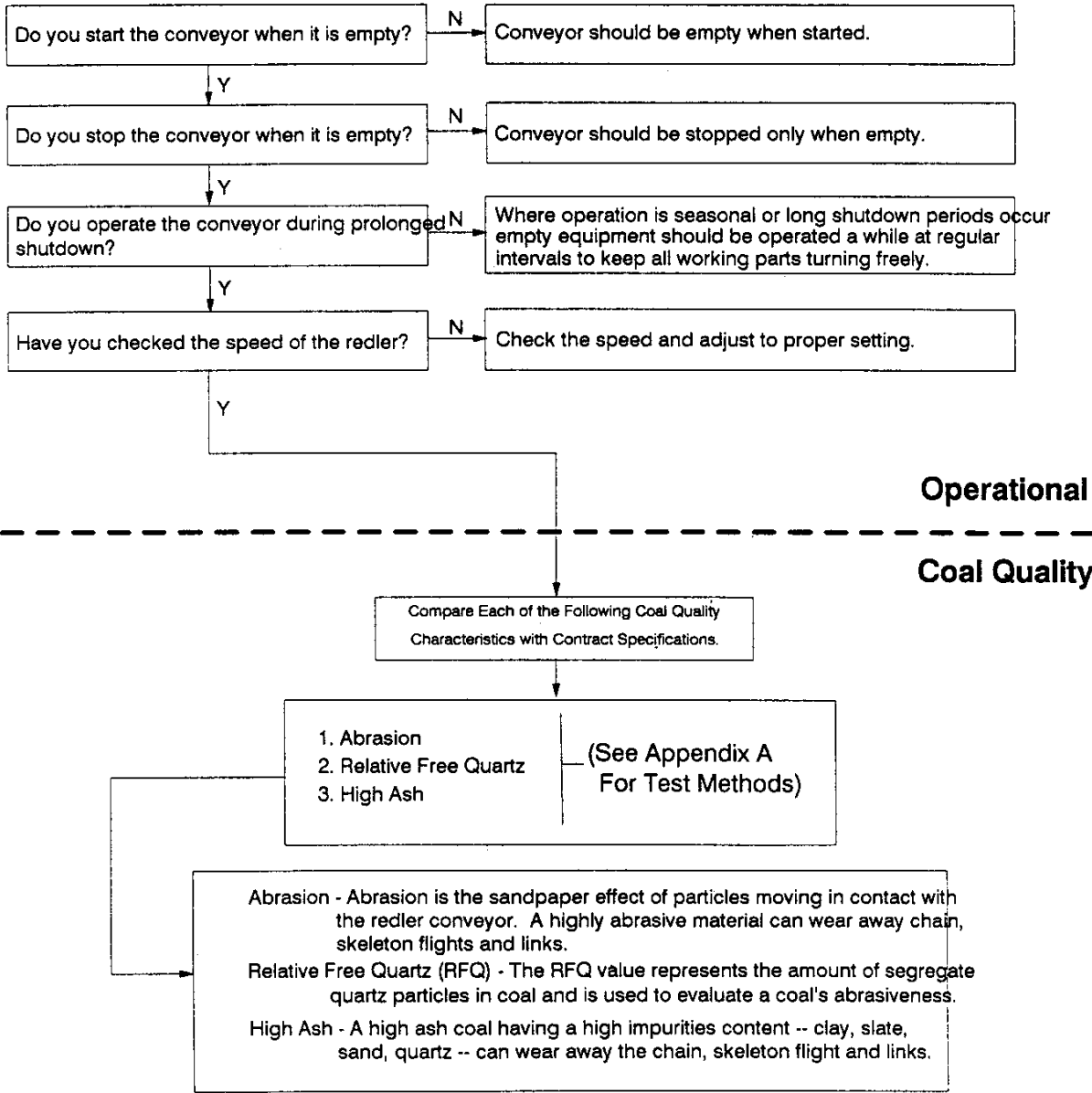


FIG1-33v1

FIGURE 1-34: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Feed Conveyor
(Redler Conveyor)

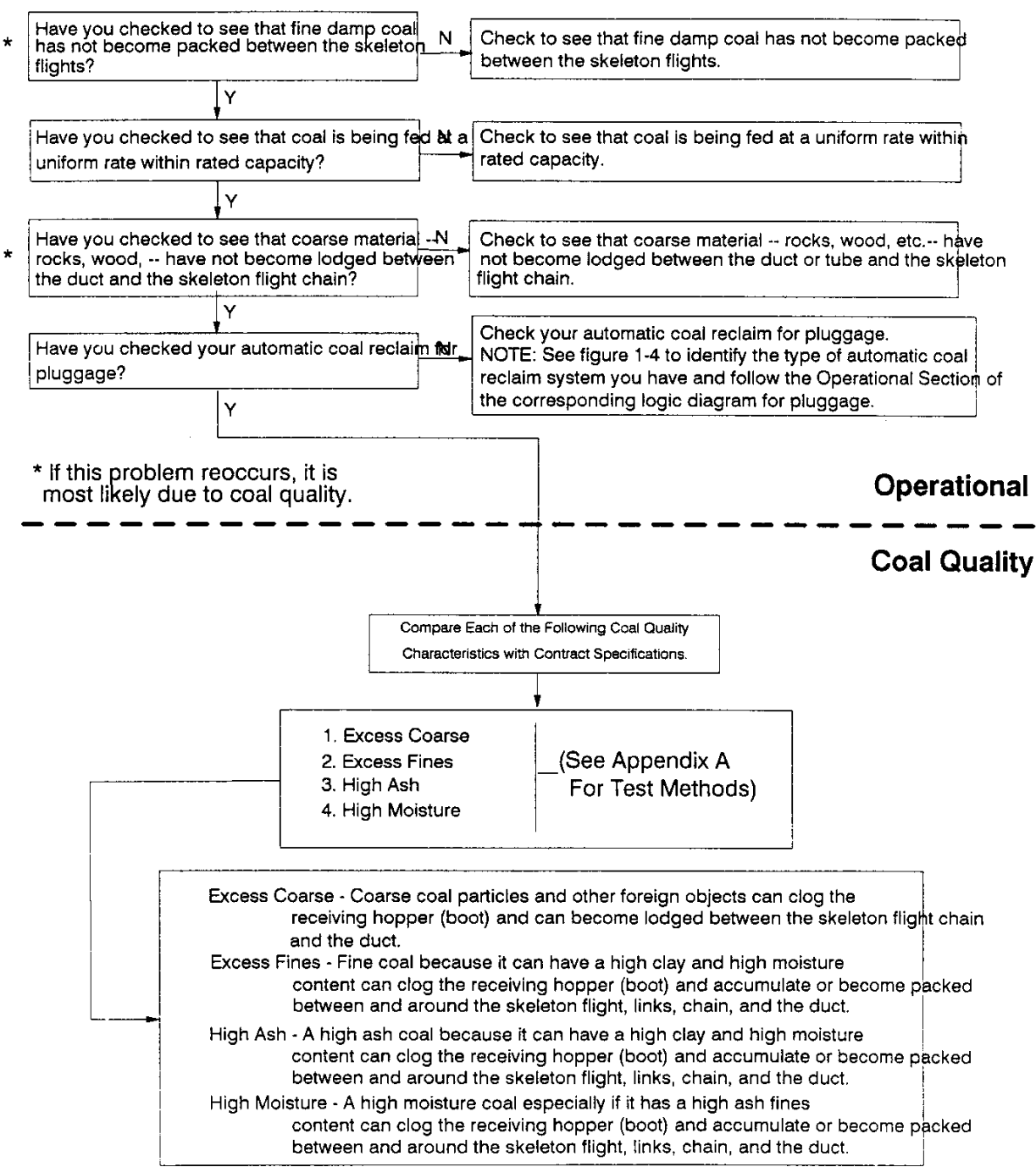


FIG1-34a/1

FIGURE 1-35: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity In The Coal Feed Conveyor
(Redler Conveyor)

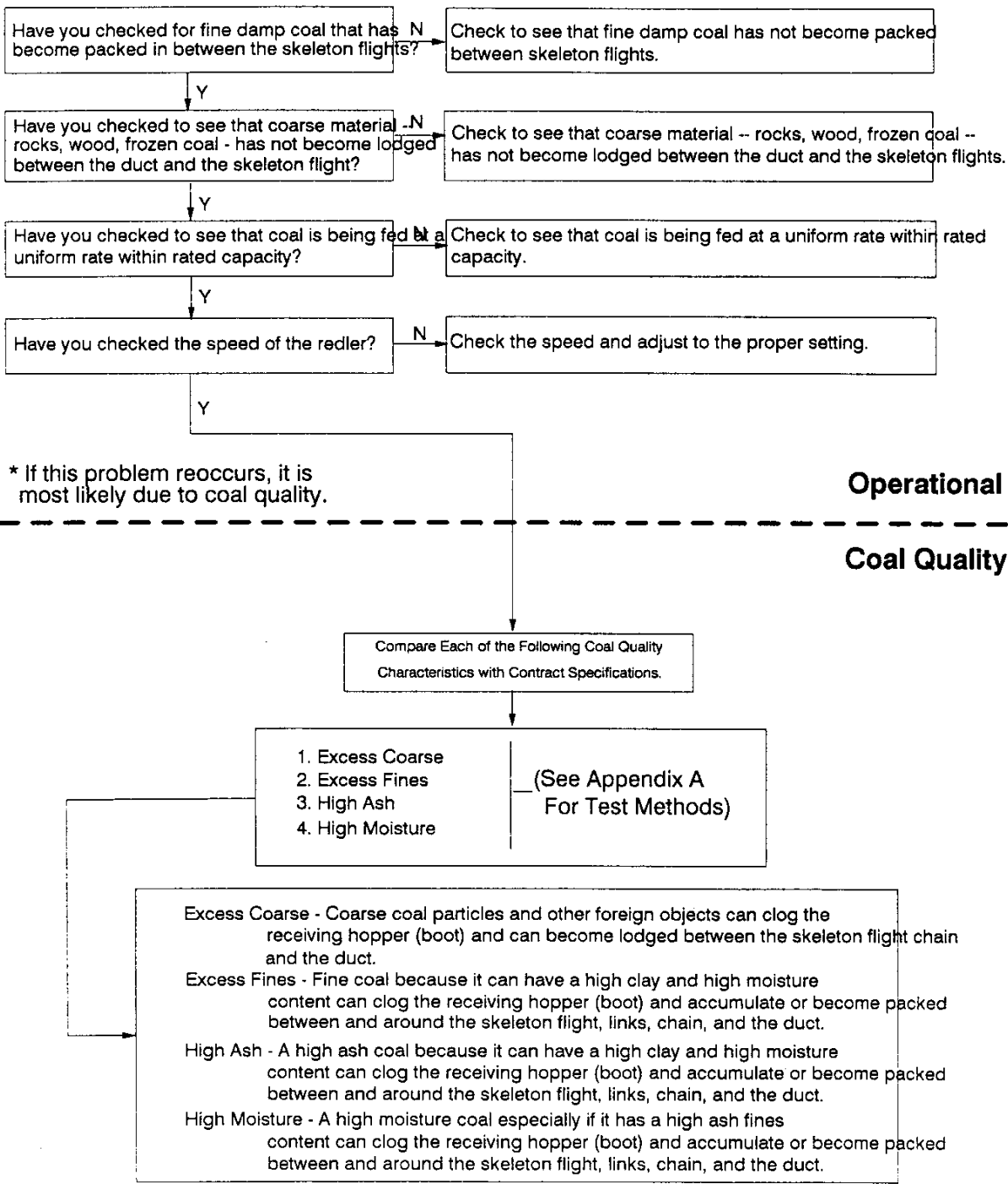


FIG1-35n/1

FIGURE 1-36: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Feed Conveyor
(Redler Conveyor)

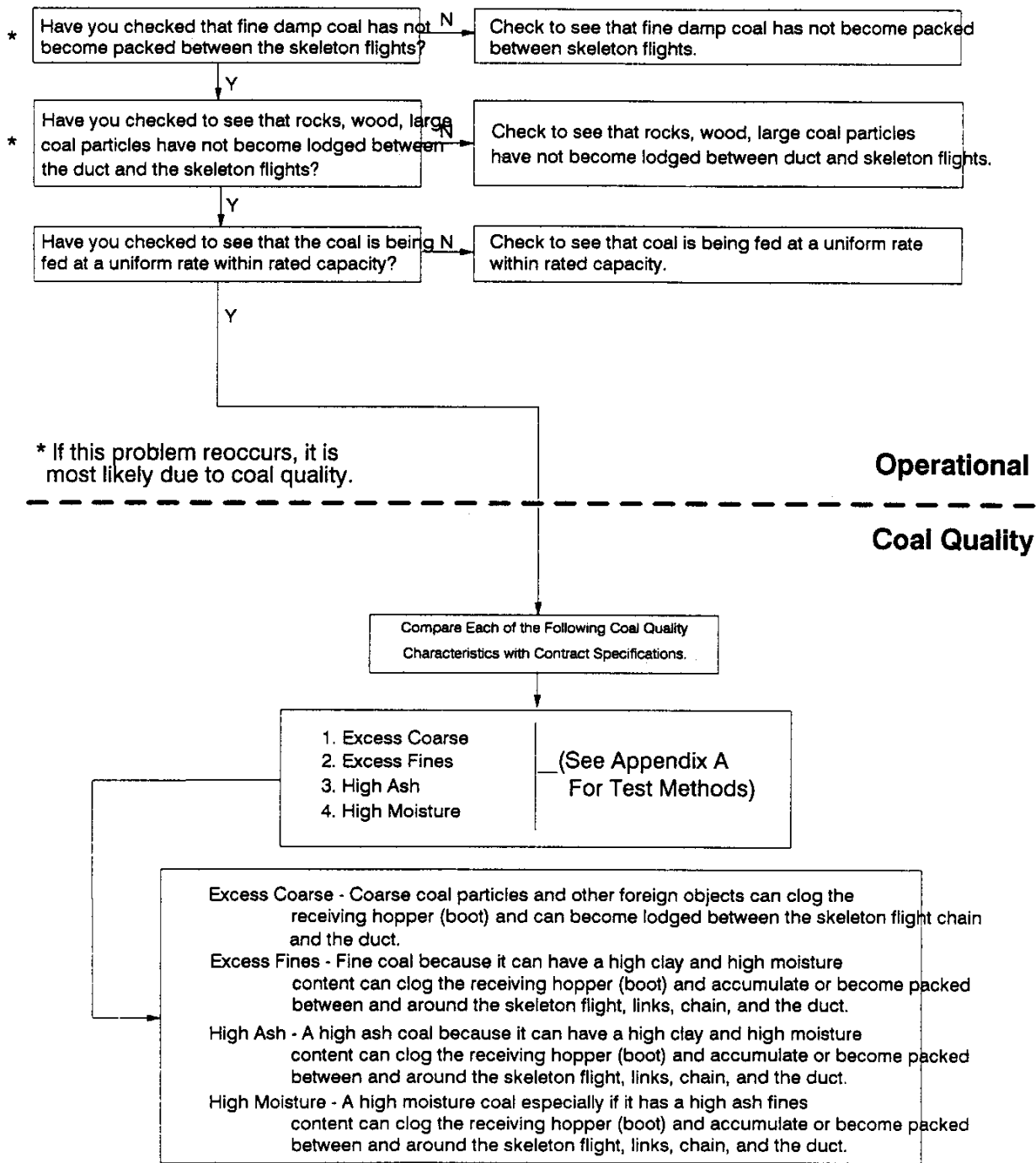


FIG1-36/v1

FIGURE 1-37: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Feed Conveyor
(Chutes)

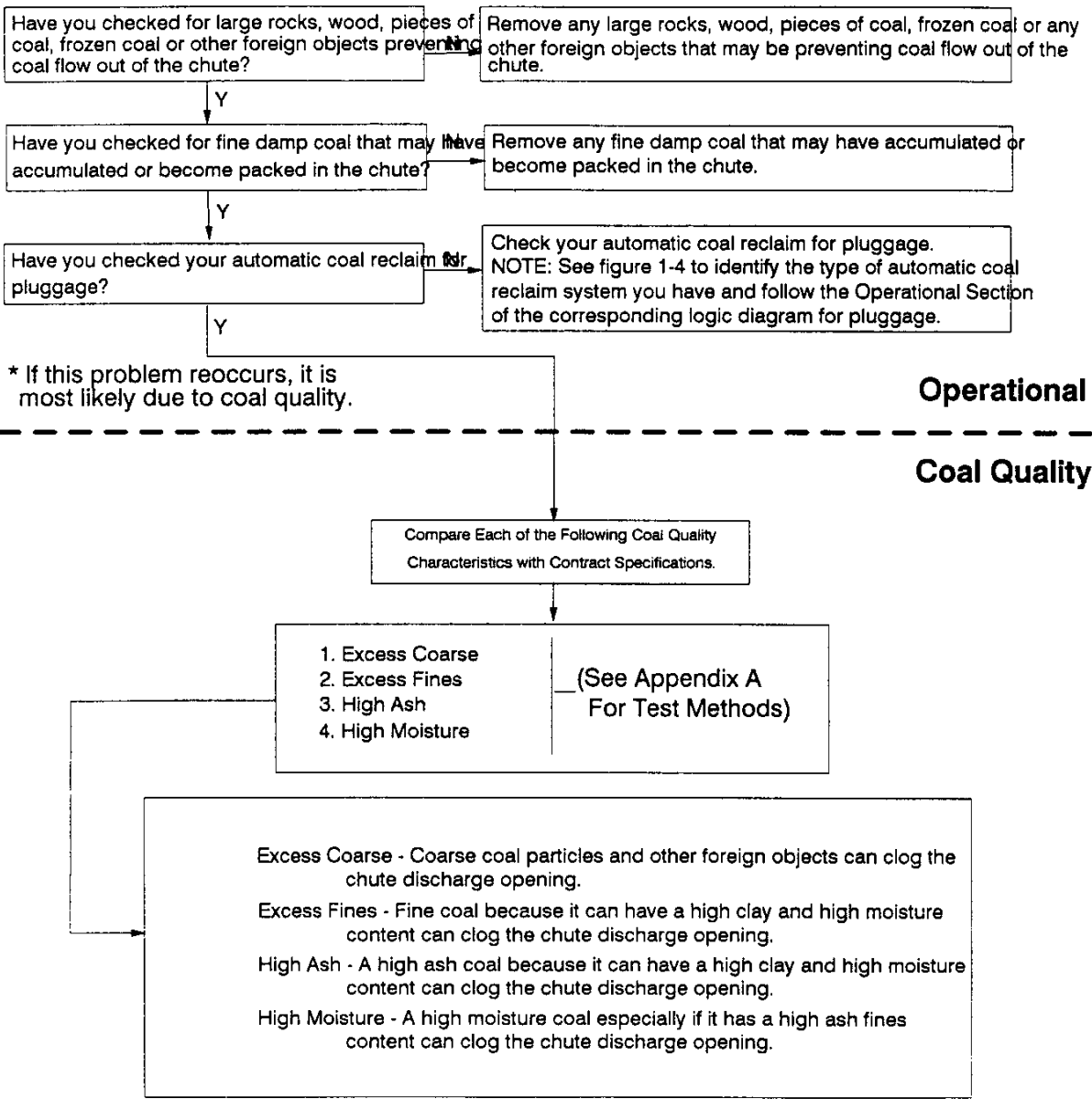


FIG1-37n/1

FIGURE 1-38: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity In The Coal Feed Conveyor
(Chutes)

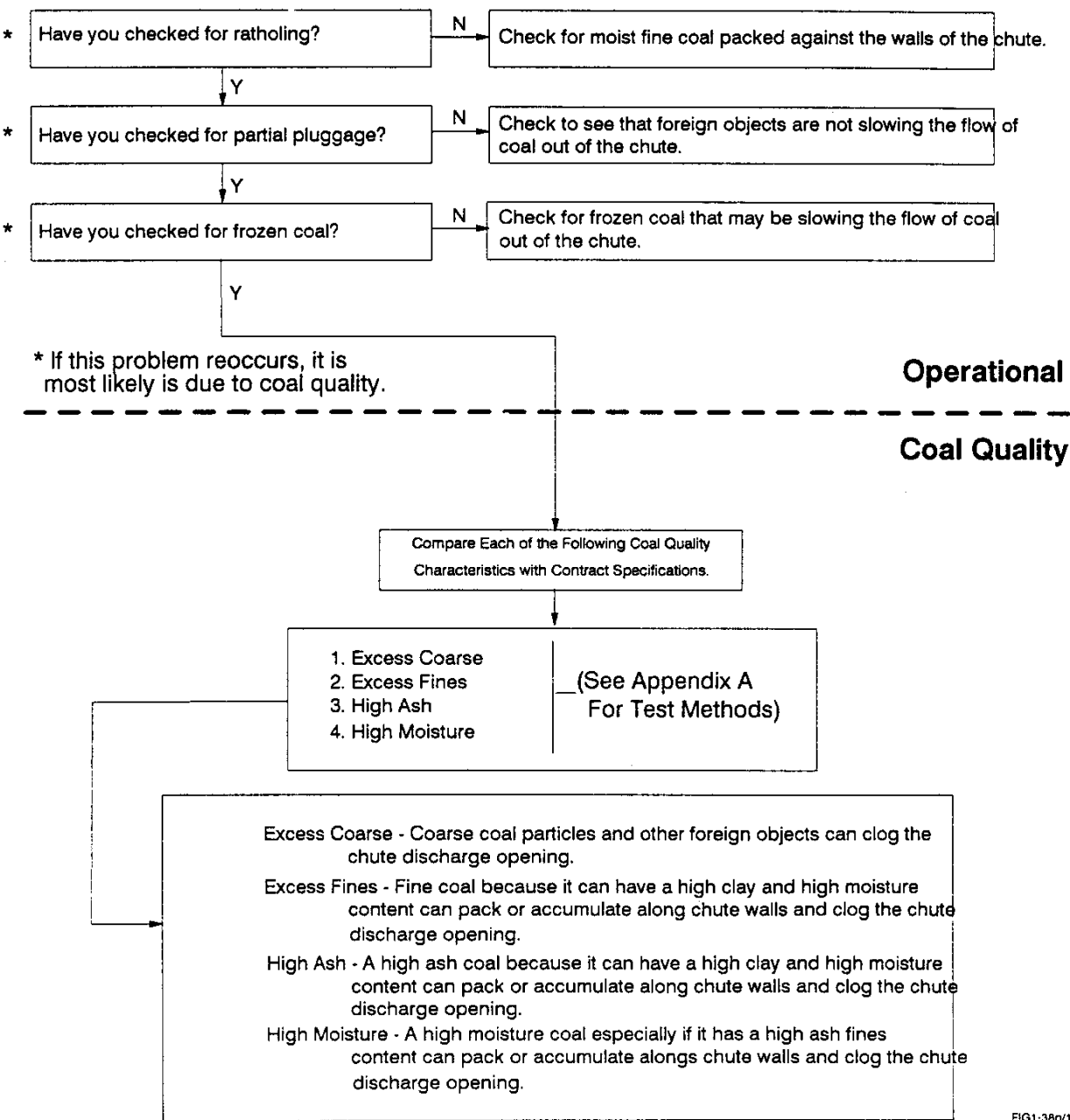


FIG1-38n/1

FIGURE 1-39: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Feed Conveyor
(Chute)

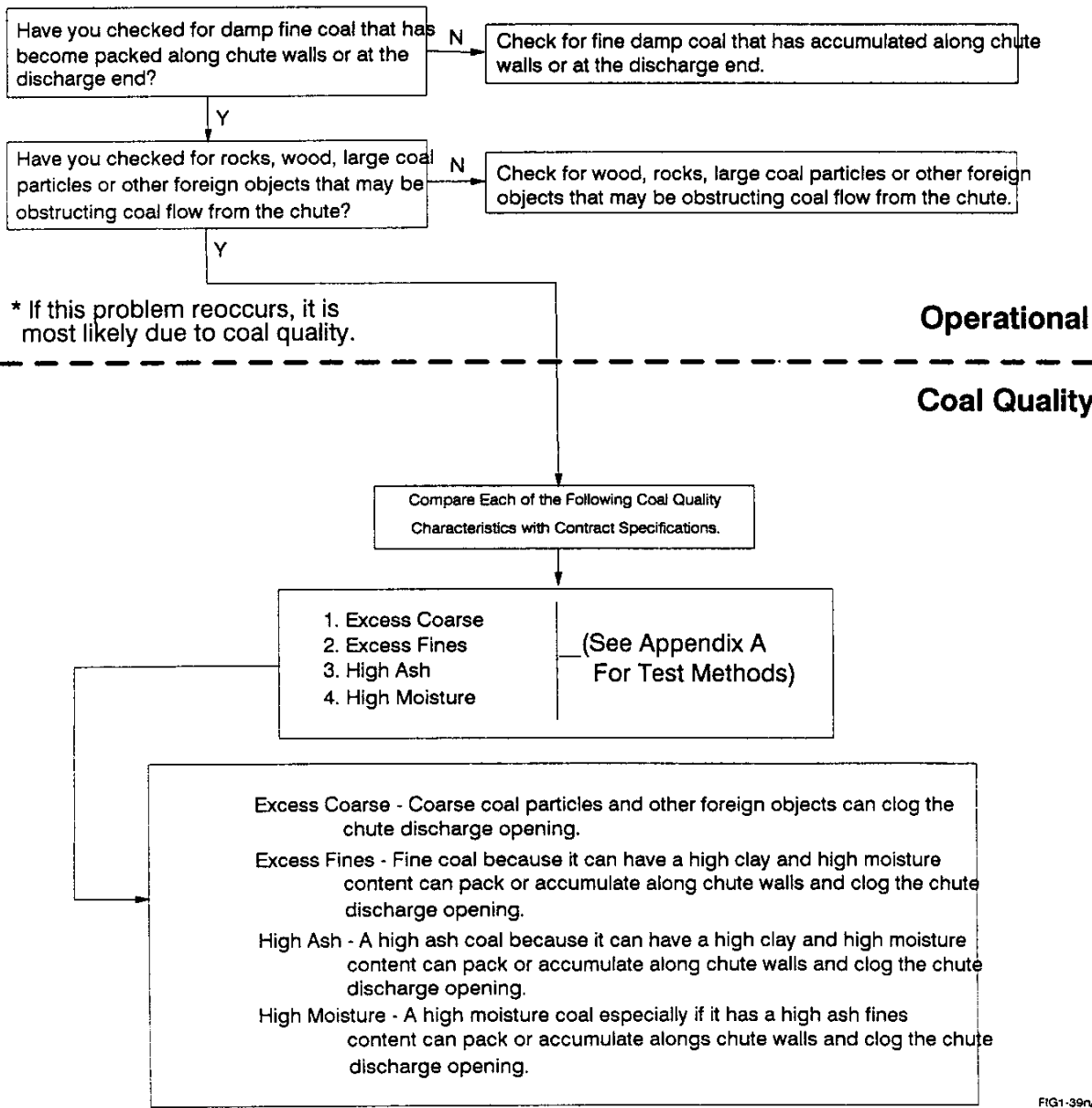


FIGURE 1-40: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Feeders
(Chute)

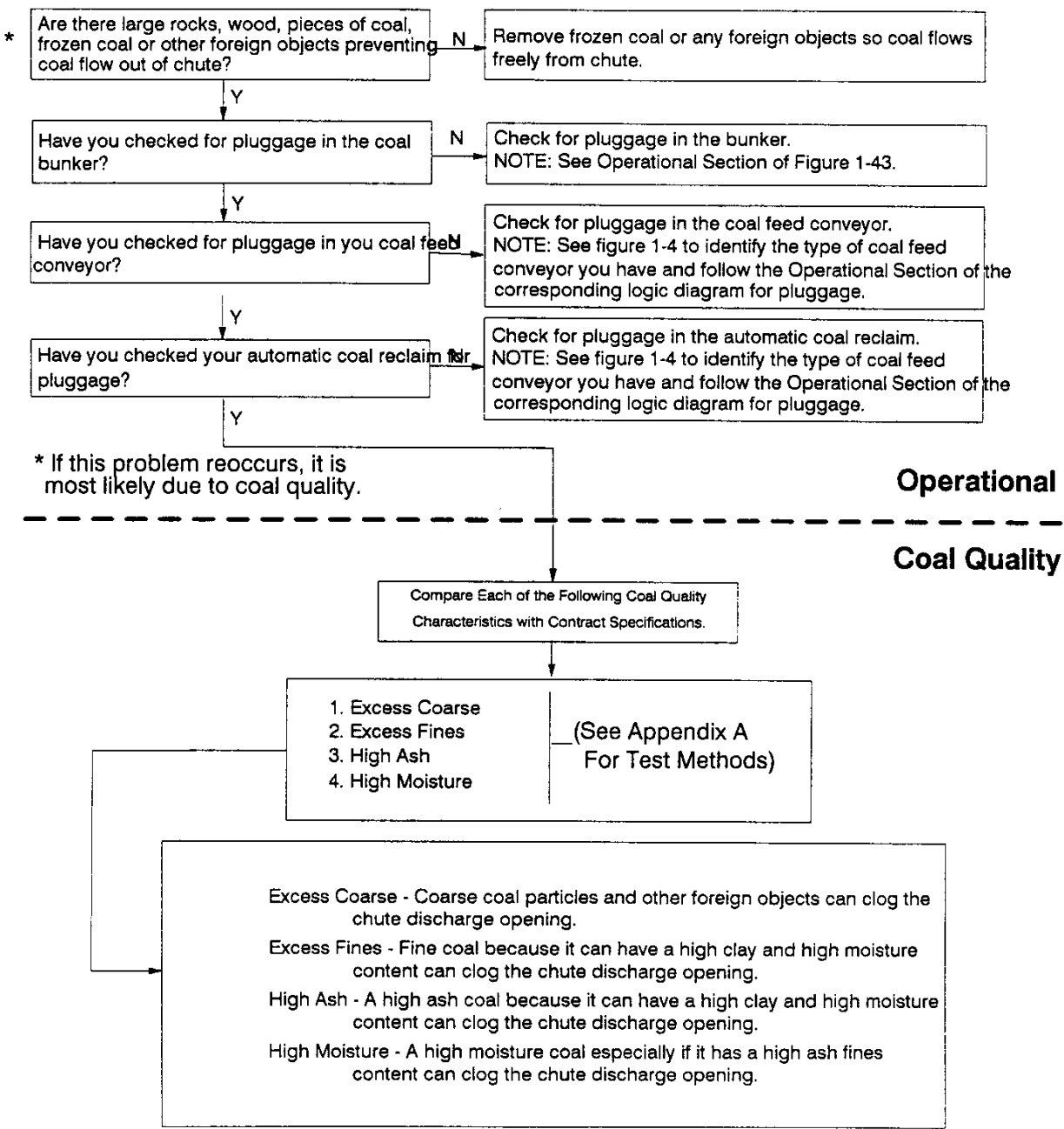


FIG1-40n/1

FIGURE 1-41: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity In the Coal Feeder
(Chutes)

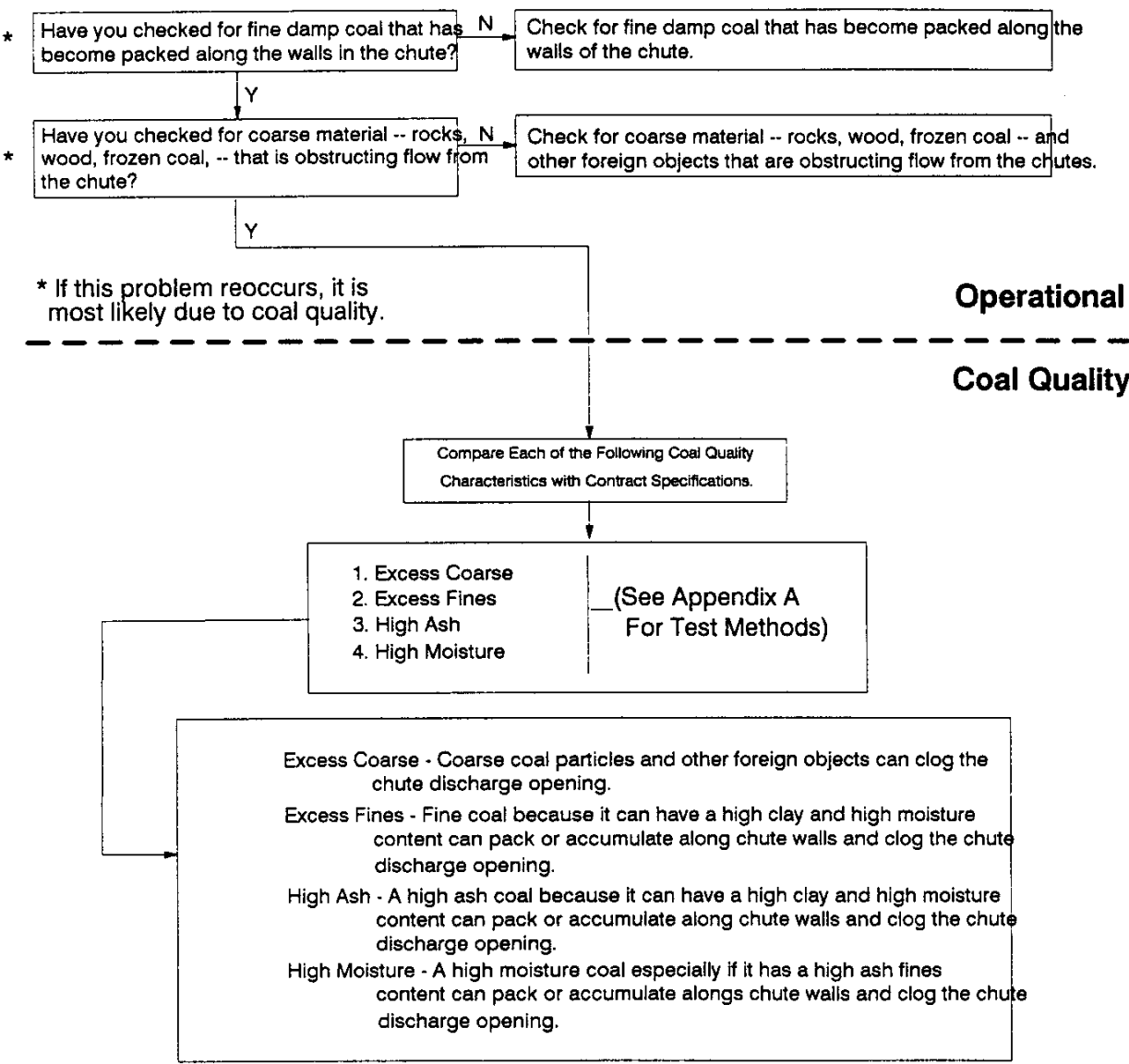


FIG1-41n/2

FIGURE 1-42: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Feeder
(Chutes)

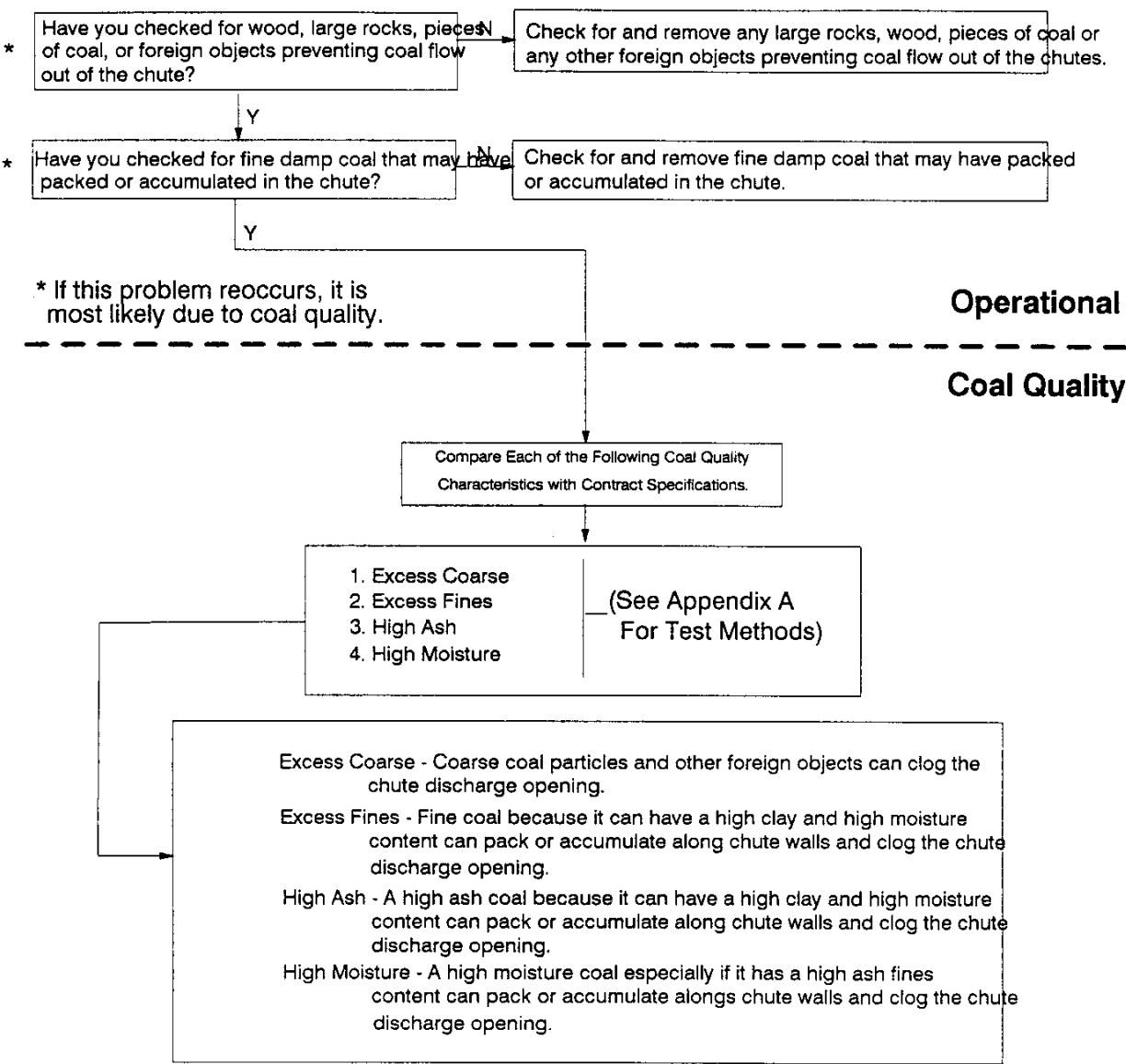


FIGURE 1-43: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Bunker

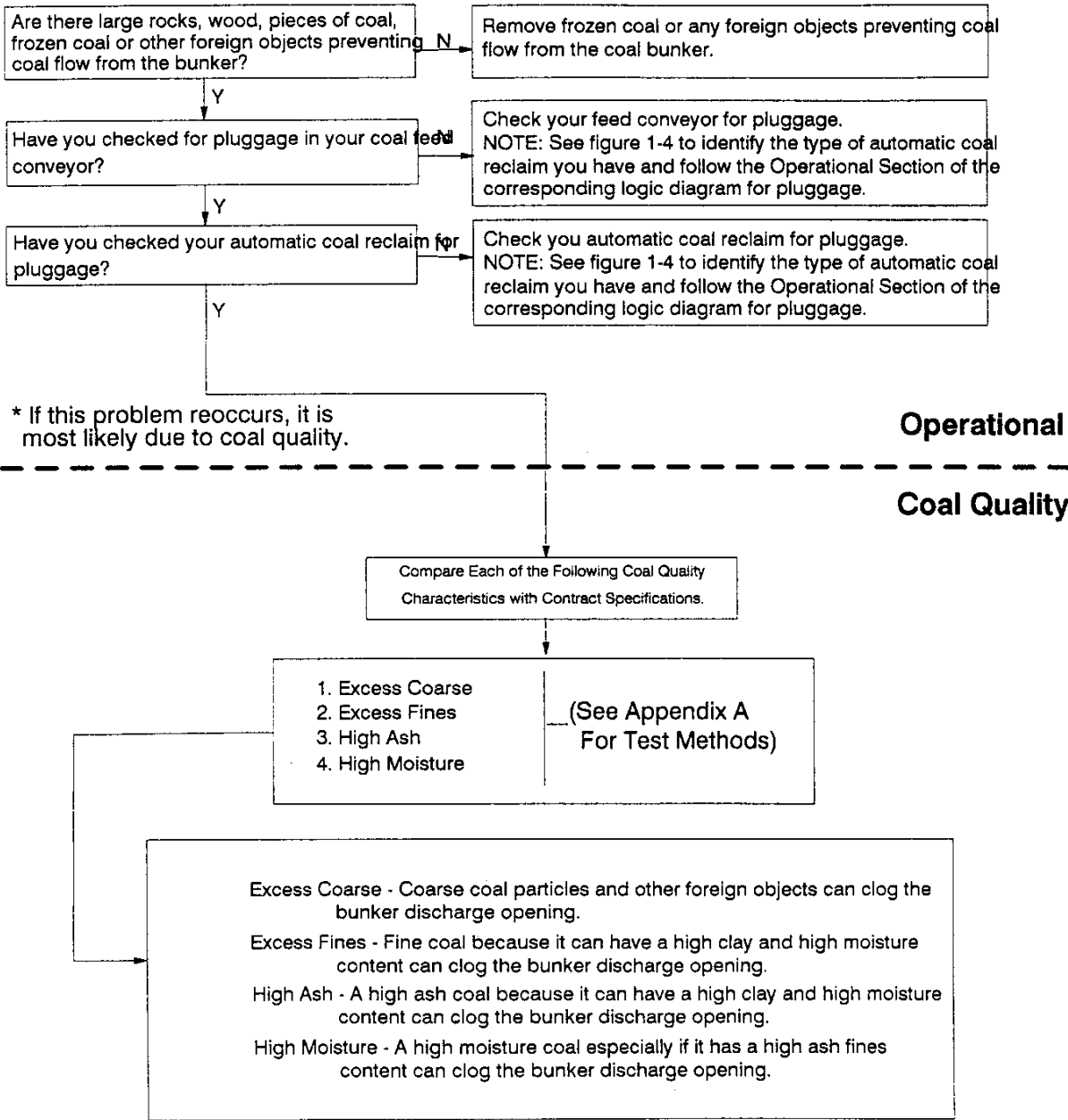


FIG1-43n/2

FIGURE 1-44: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity In The Bunker

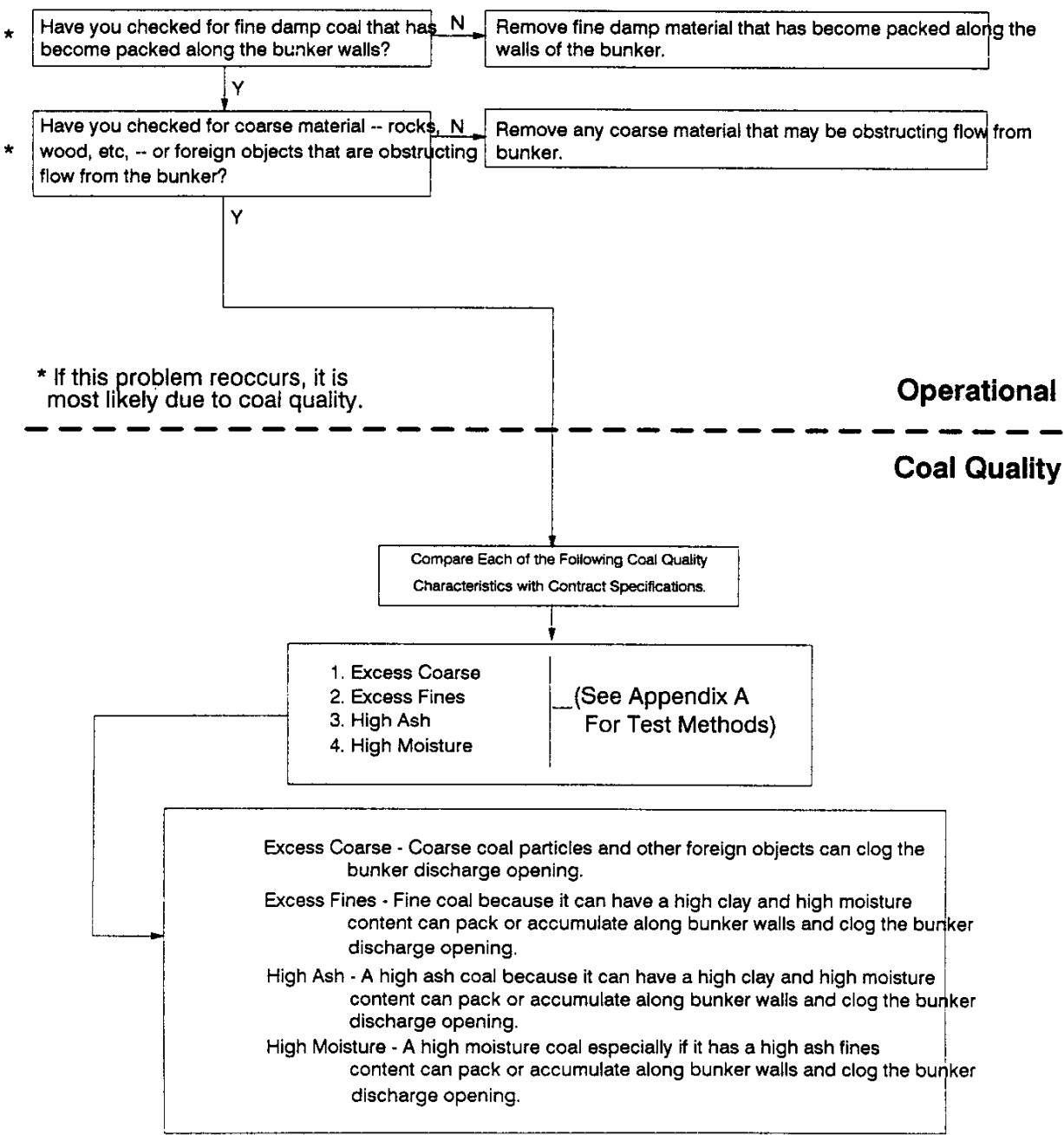


FIG1-44n/2

FIGURE 1-45: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Bunker

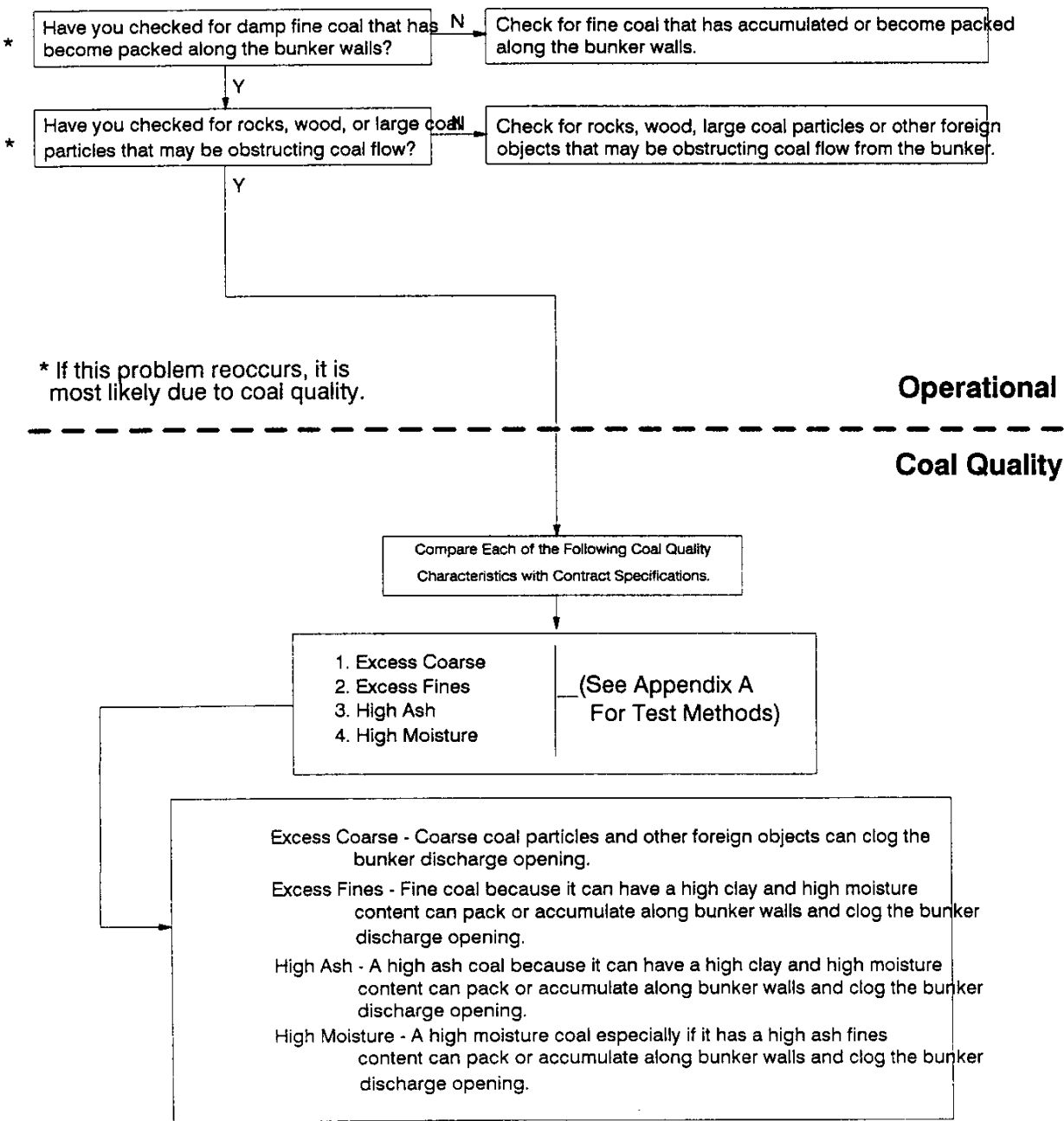


FIG1-45n/2

FIGURE 1-46: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Hopper

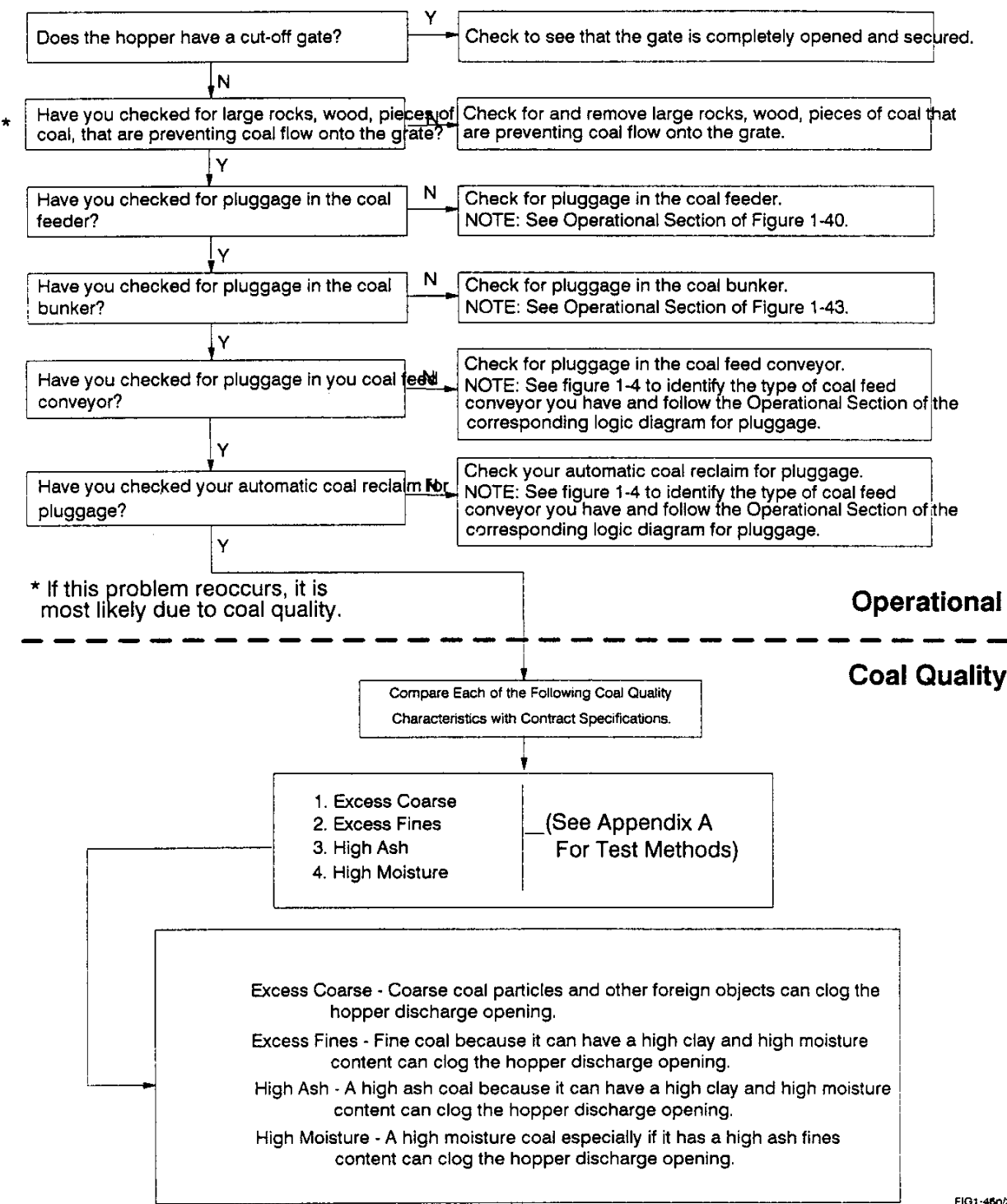


FIG1-46n/2

FIGURE 1-47: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM

Insufficient Capacity In The Coal Hopper

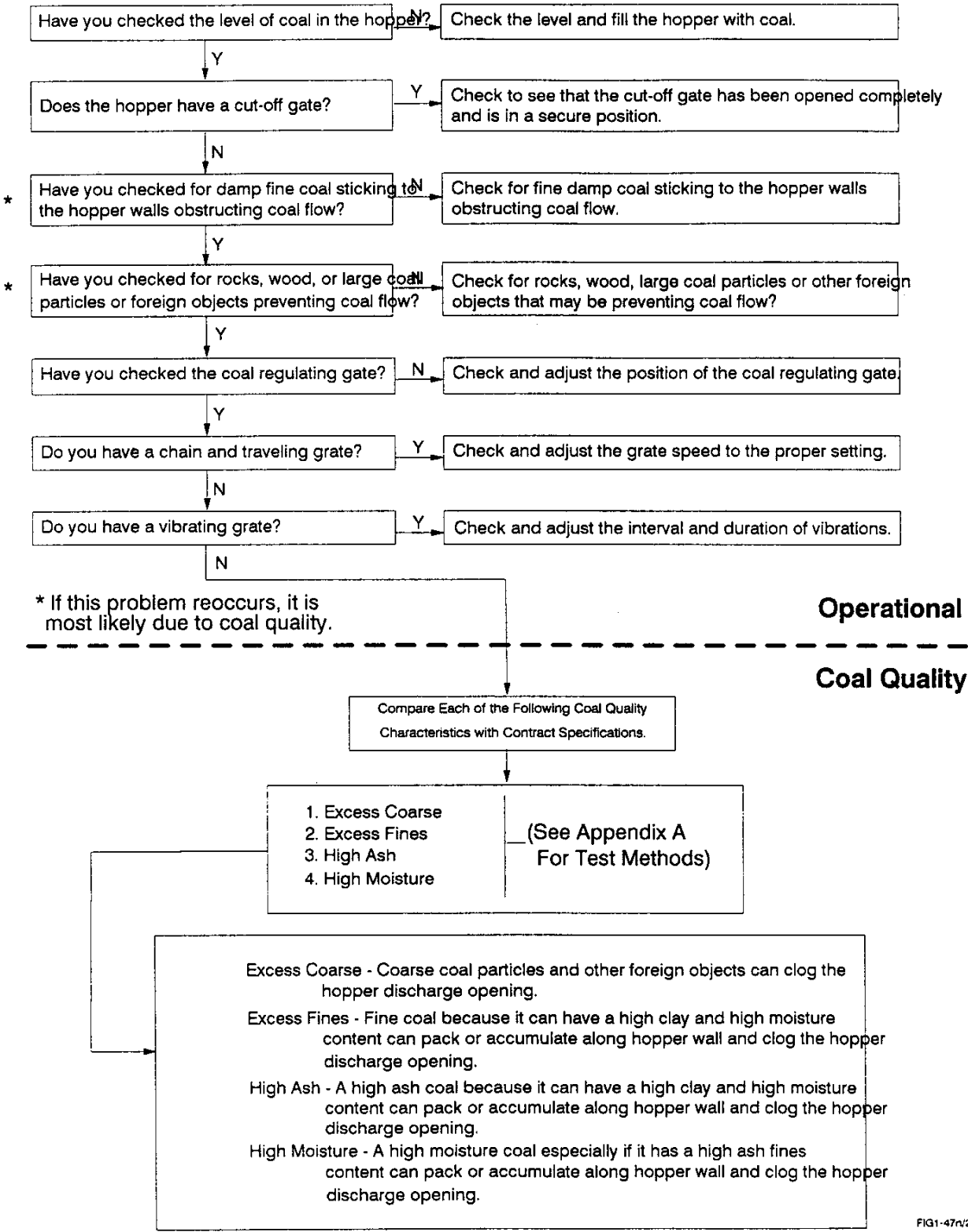


FIG1-47n/2

FIGURE 1-48: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Hopper

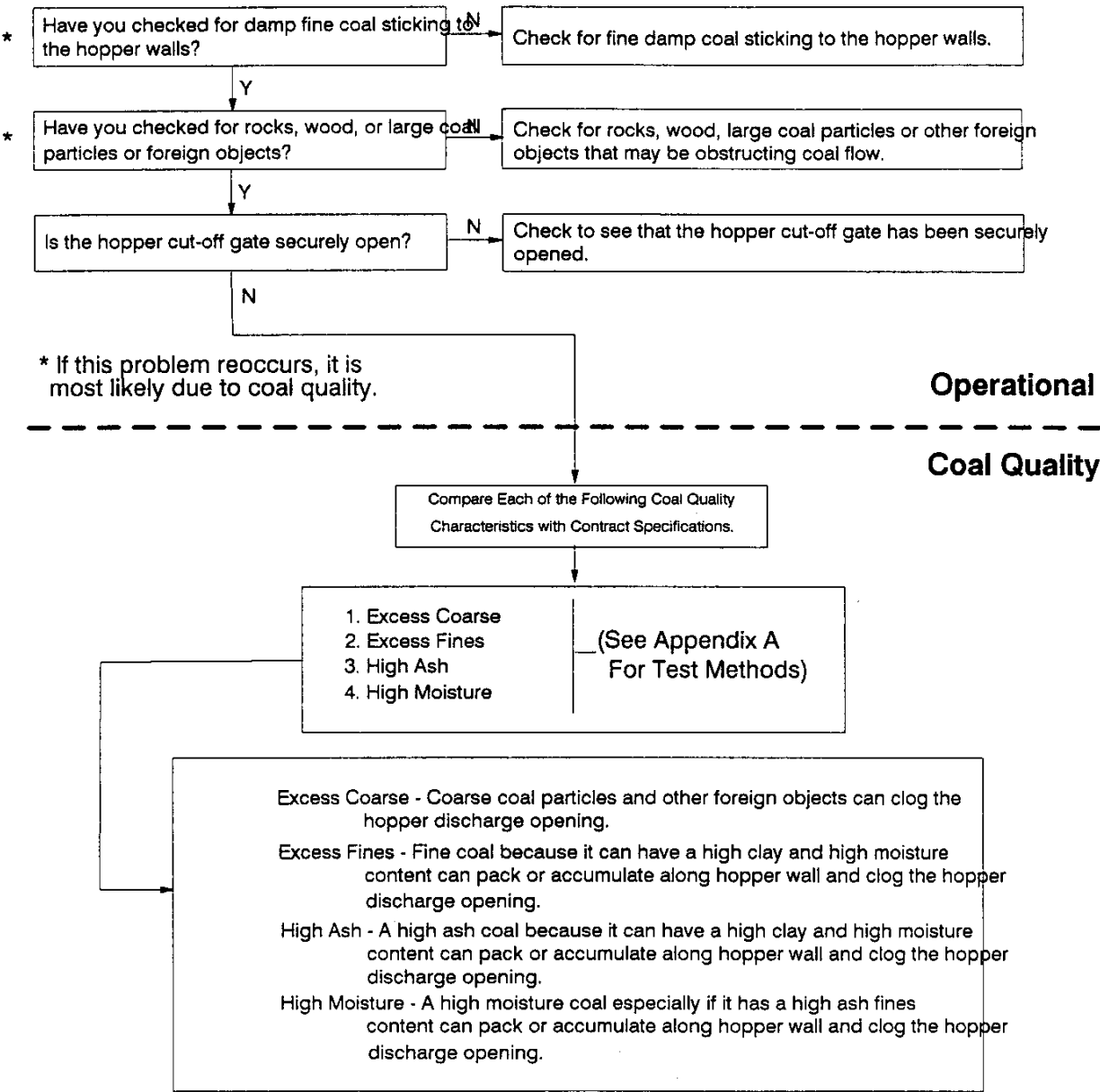


FIG1-48n/2

FIGURE 1-49: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Excess Wear Of The Coal Regulating Gate

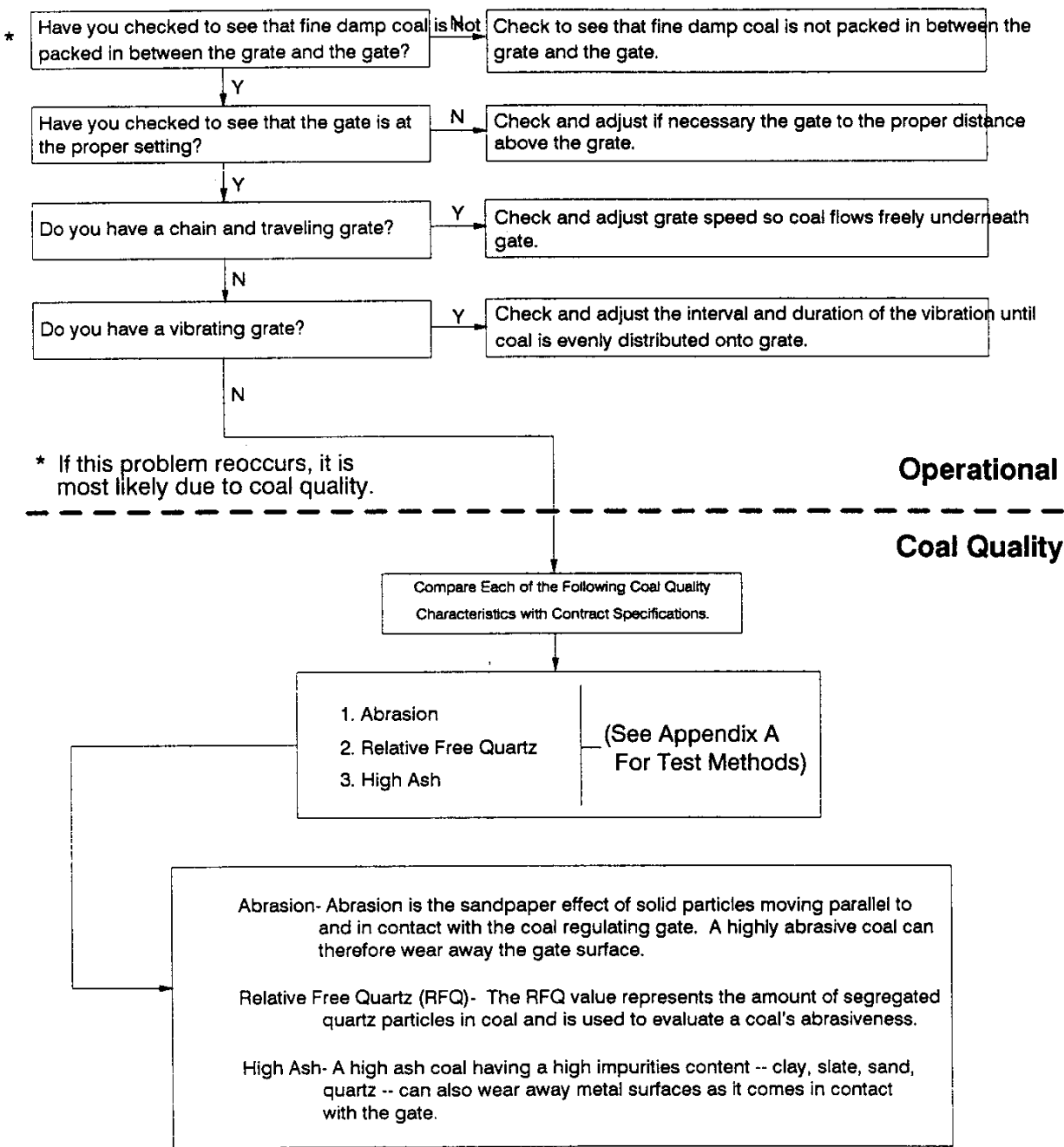


FIG1-49N/2

FIGURE 1-50: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Regulating Gate

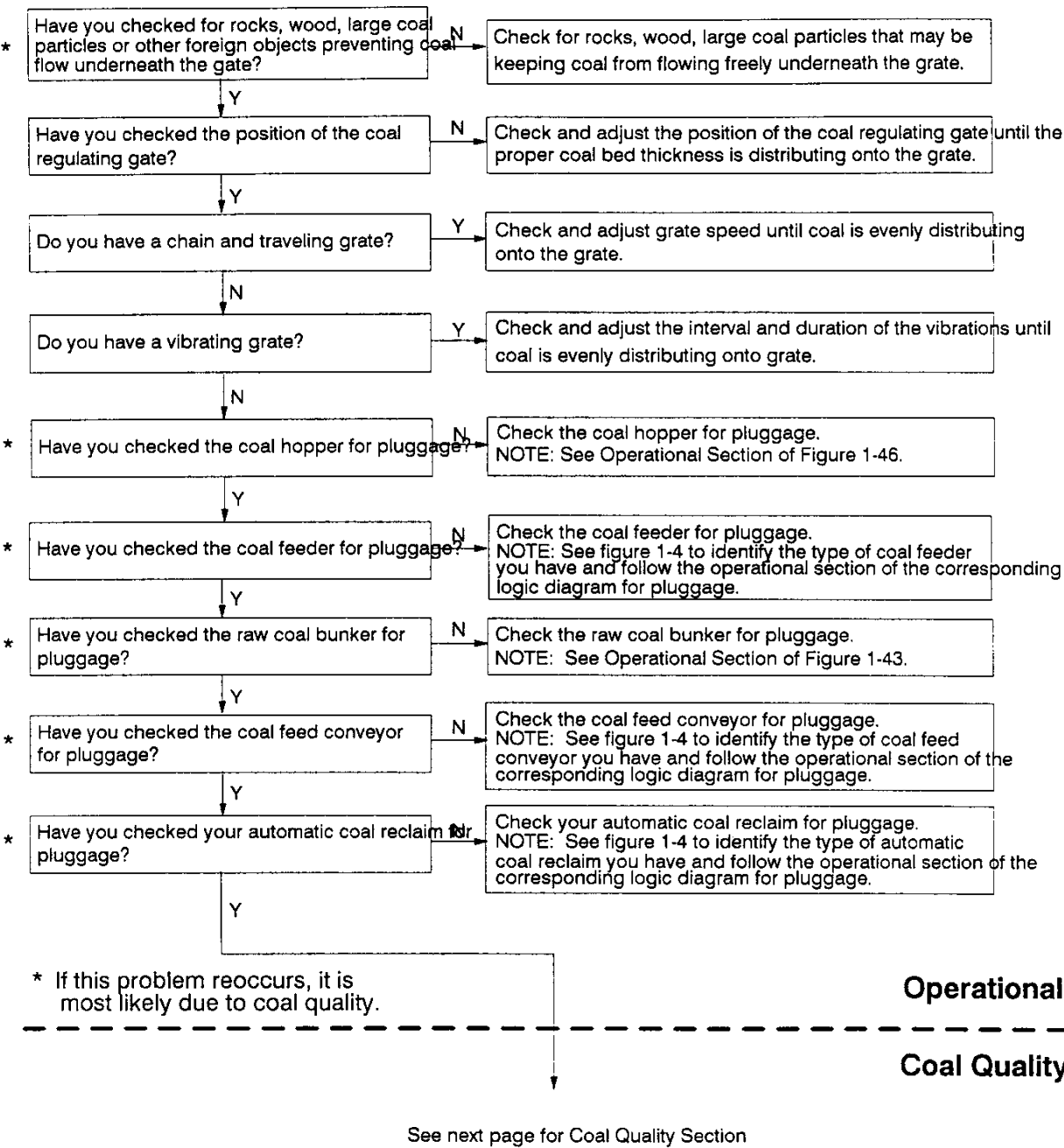


FIGURE 1-50 (continued): OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Pluggage In The Coal Regulating Gate

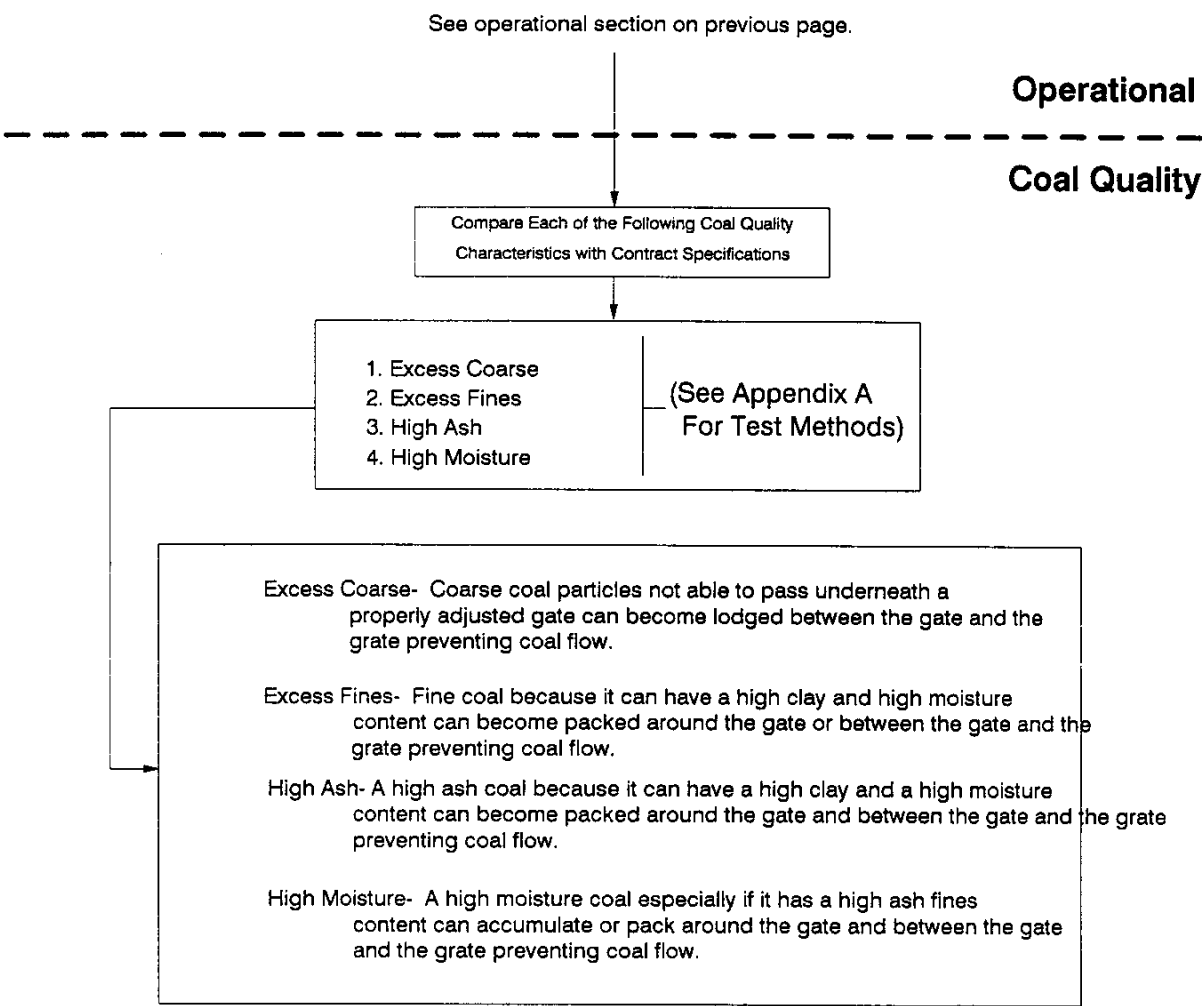


FIGURE 1-51: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity Of The Coal Regulating Gate

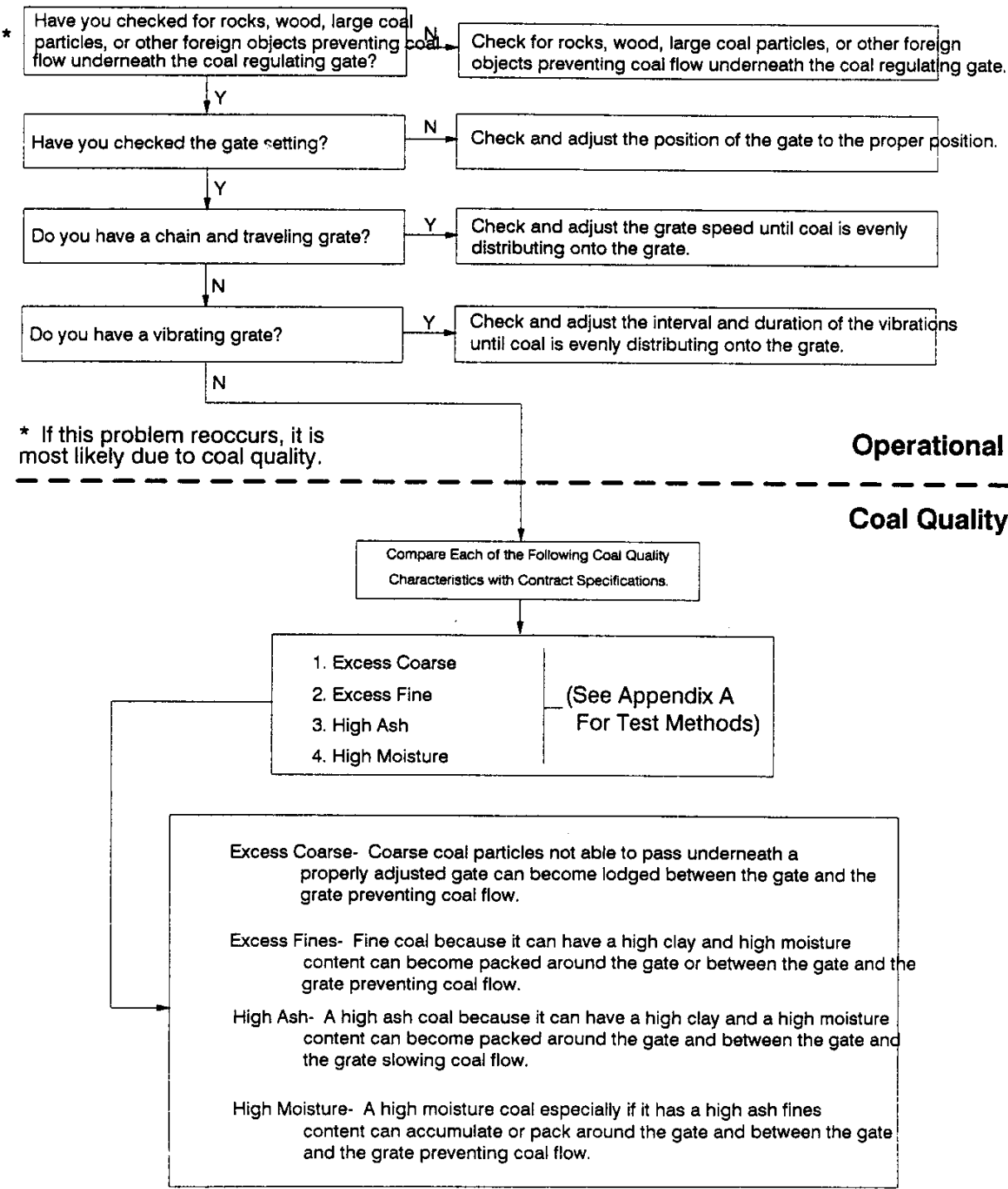


FIG1-51N/2

FIGURE 1-52: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erratic Feeding From The Coal Regulating Gate

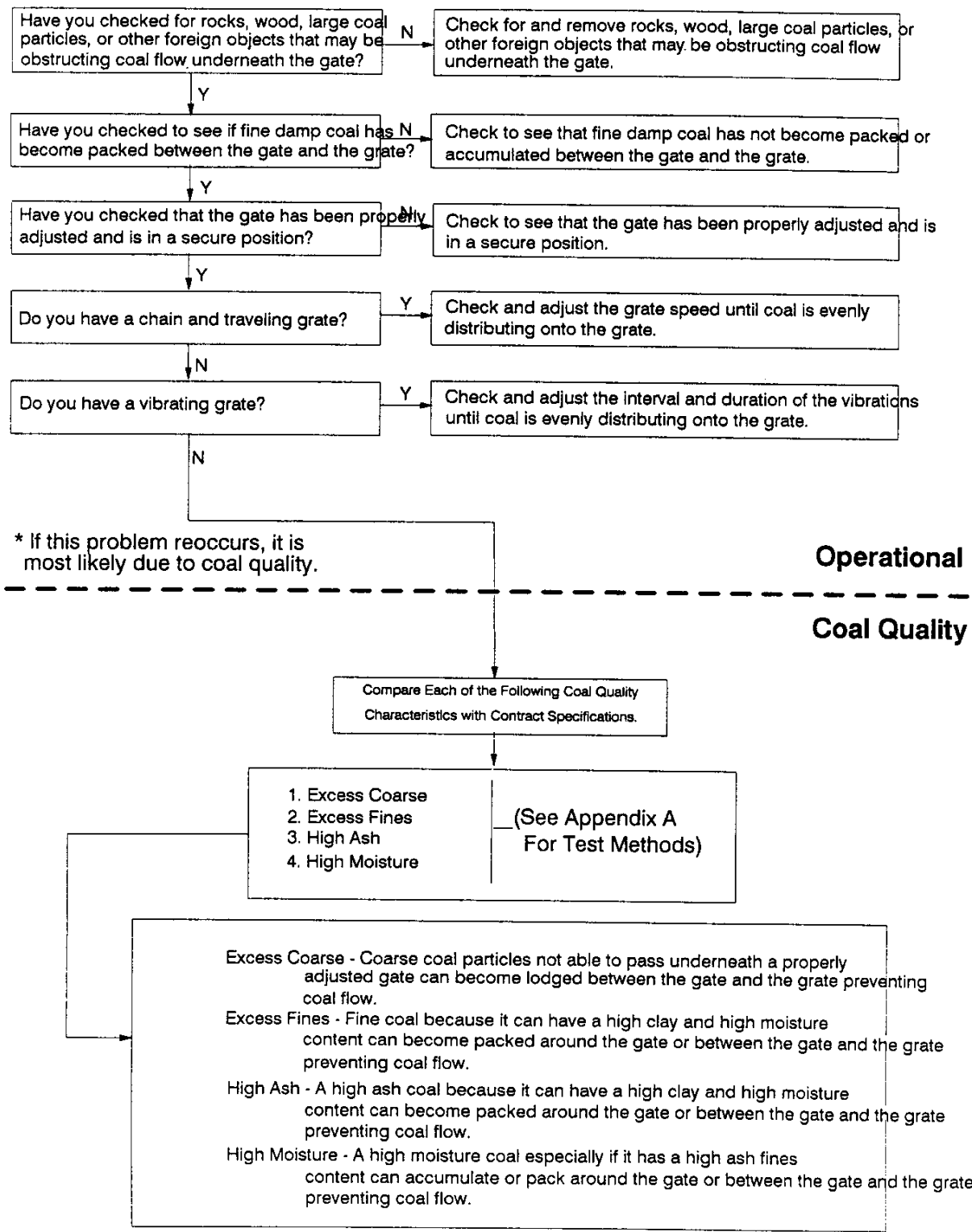


FIG1-52v2

FIGURE 1-53: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity And Inability To Meet Load
(Boiler)

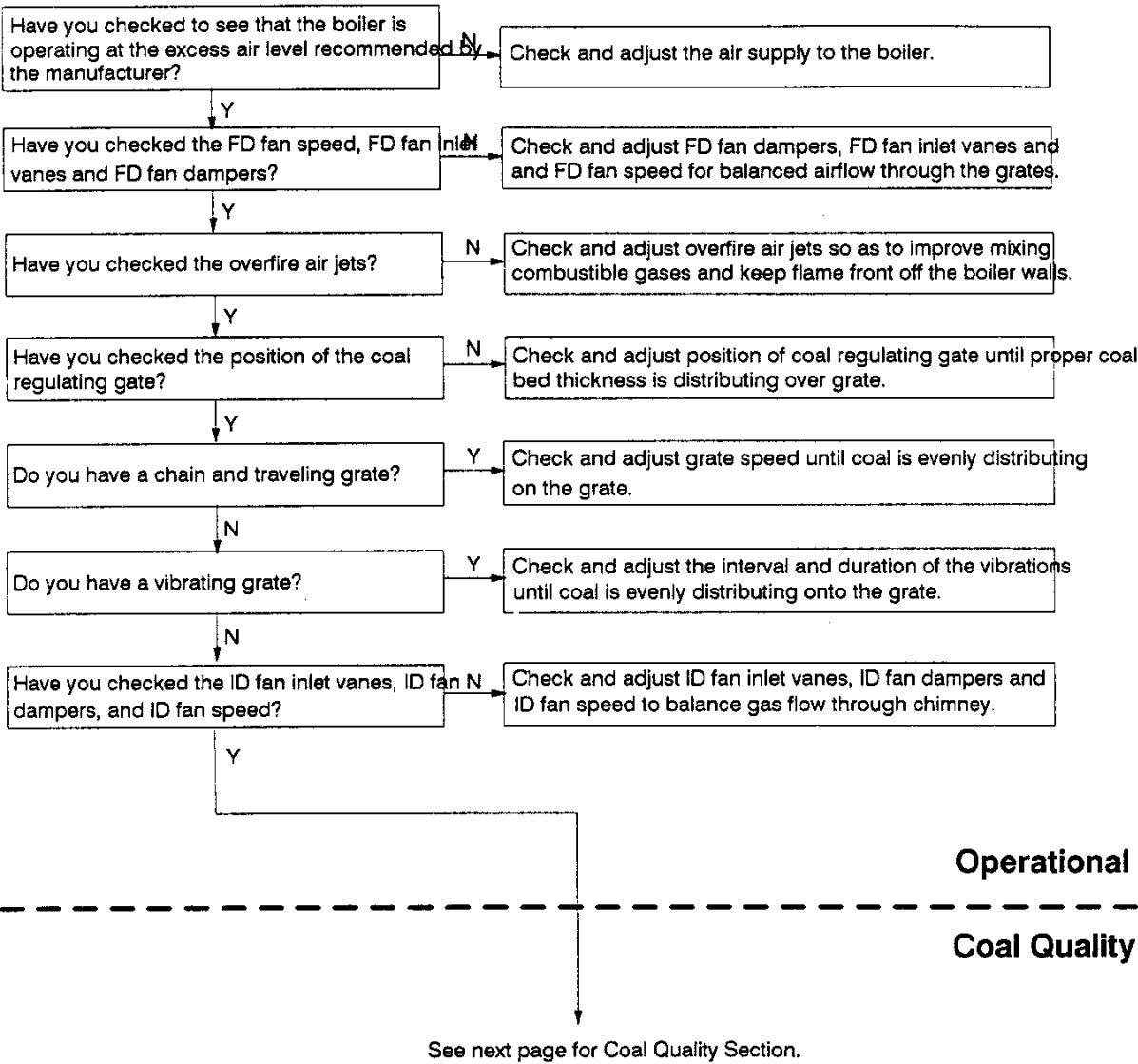


FIG1-53n/2

FIGURE 1-53 (continued): OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity And Inability To Meet Load

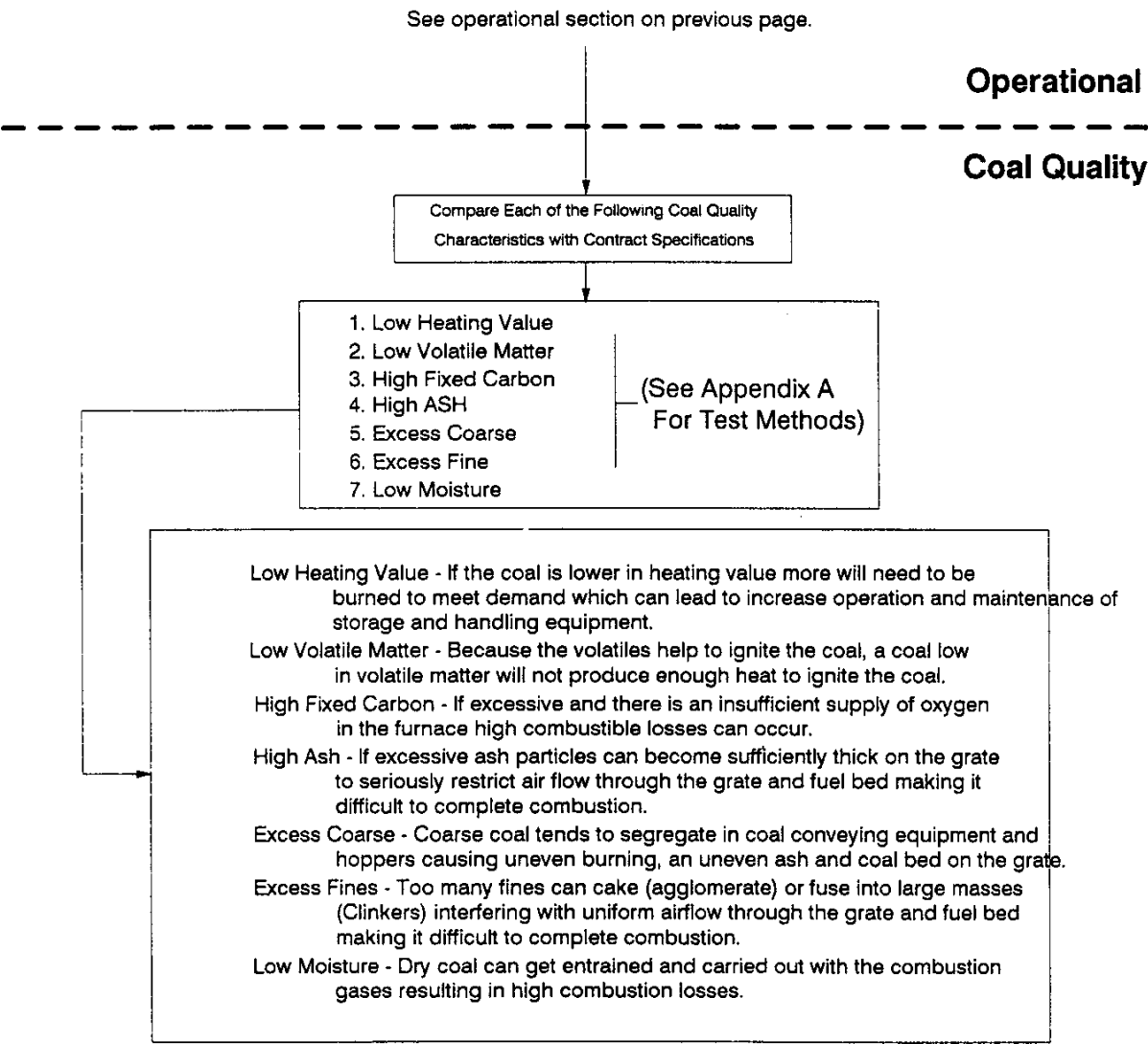


FIG1-53nb/2

FIGURE 1-54: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Reduced Boiler Efficiency

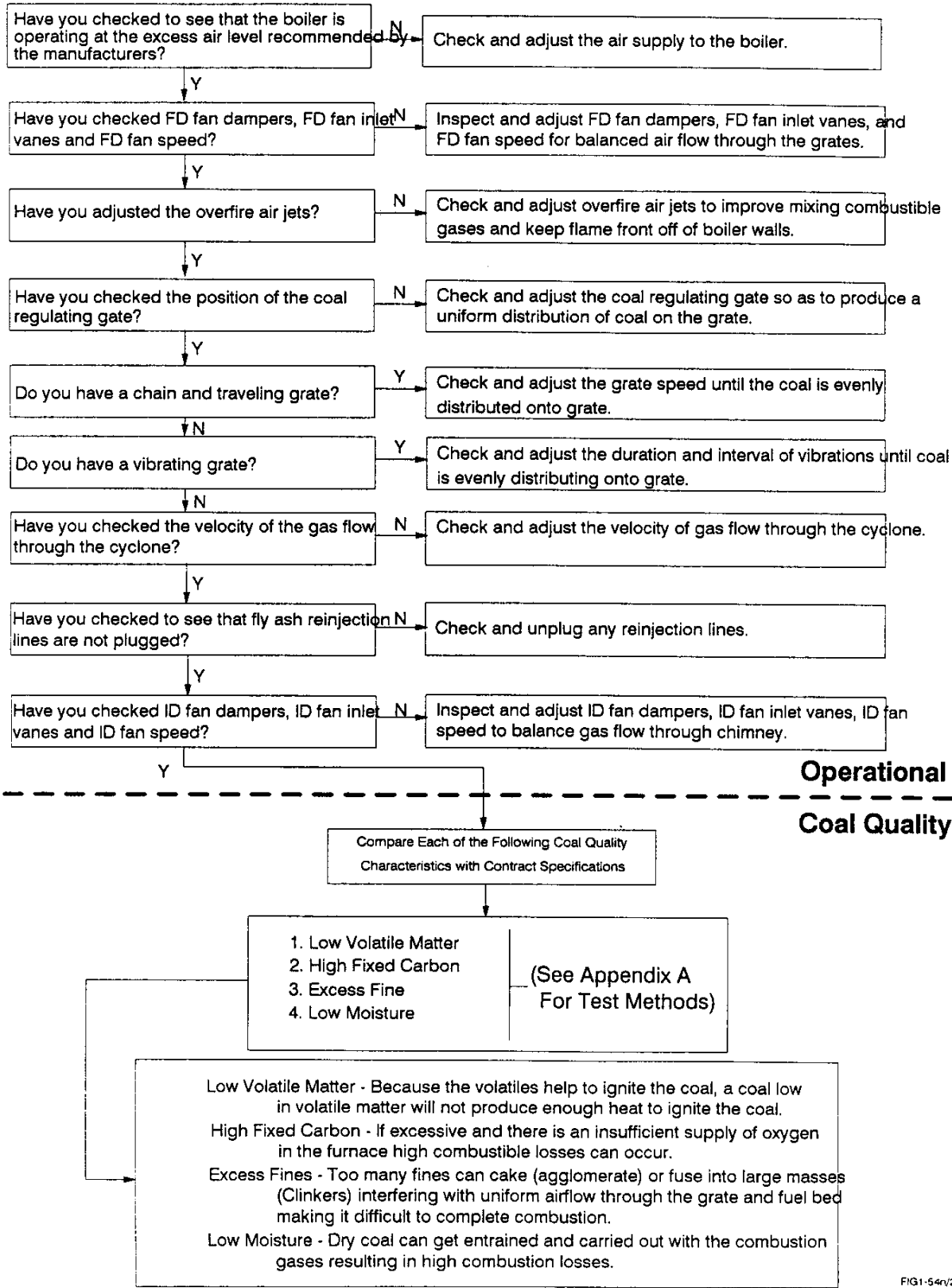


FIG1-54r/2

FIGURE 1-55: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Corrosion Of The Boiler Components
(Chain and Traveling Grate, and Vibrating Grate)

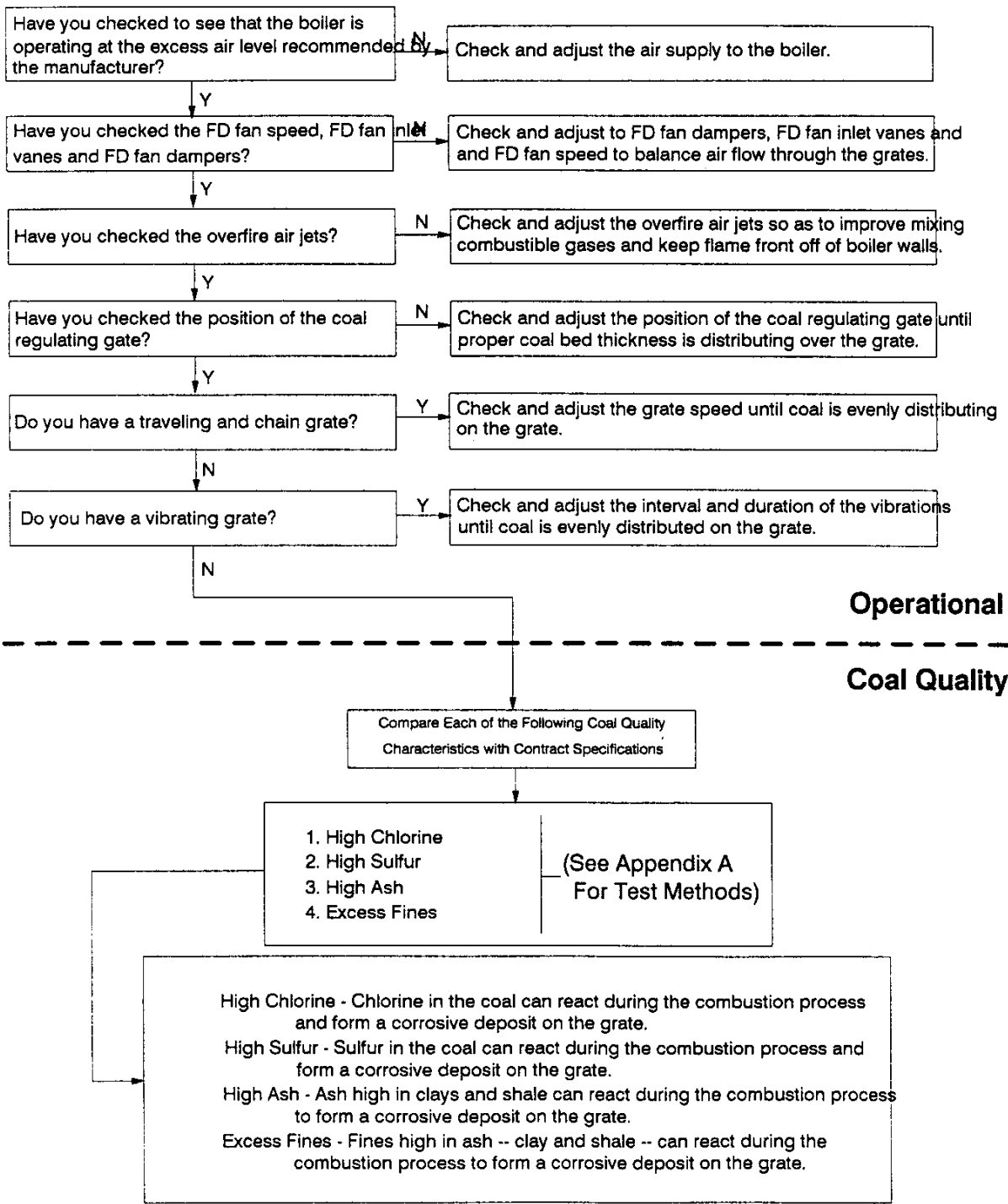


FIG1-55v2

FIGURE 1-56: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Segregation On The Gate

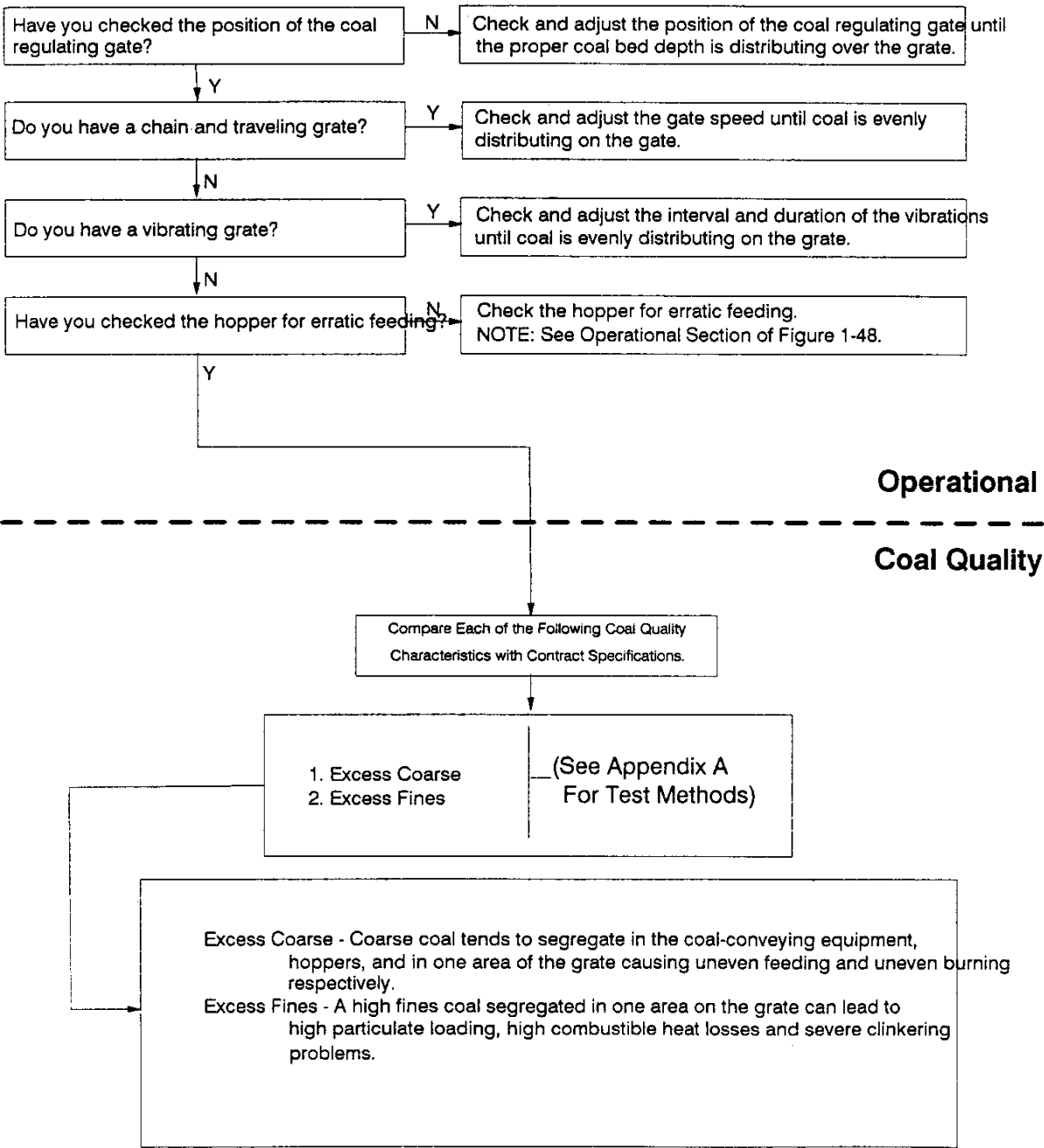


FIG1-56v2

FIGURE 1-57: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Pressure Drop Across The Grates
(Chain And Traveling Grate, Or Vibrating Grate)

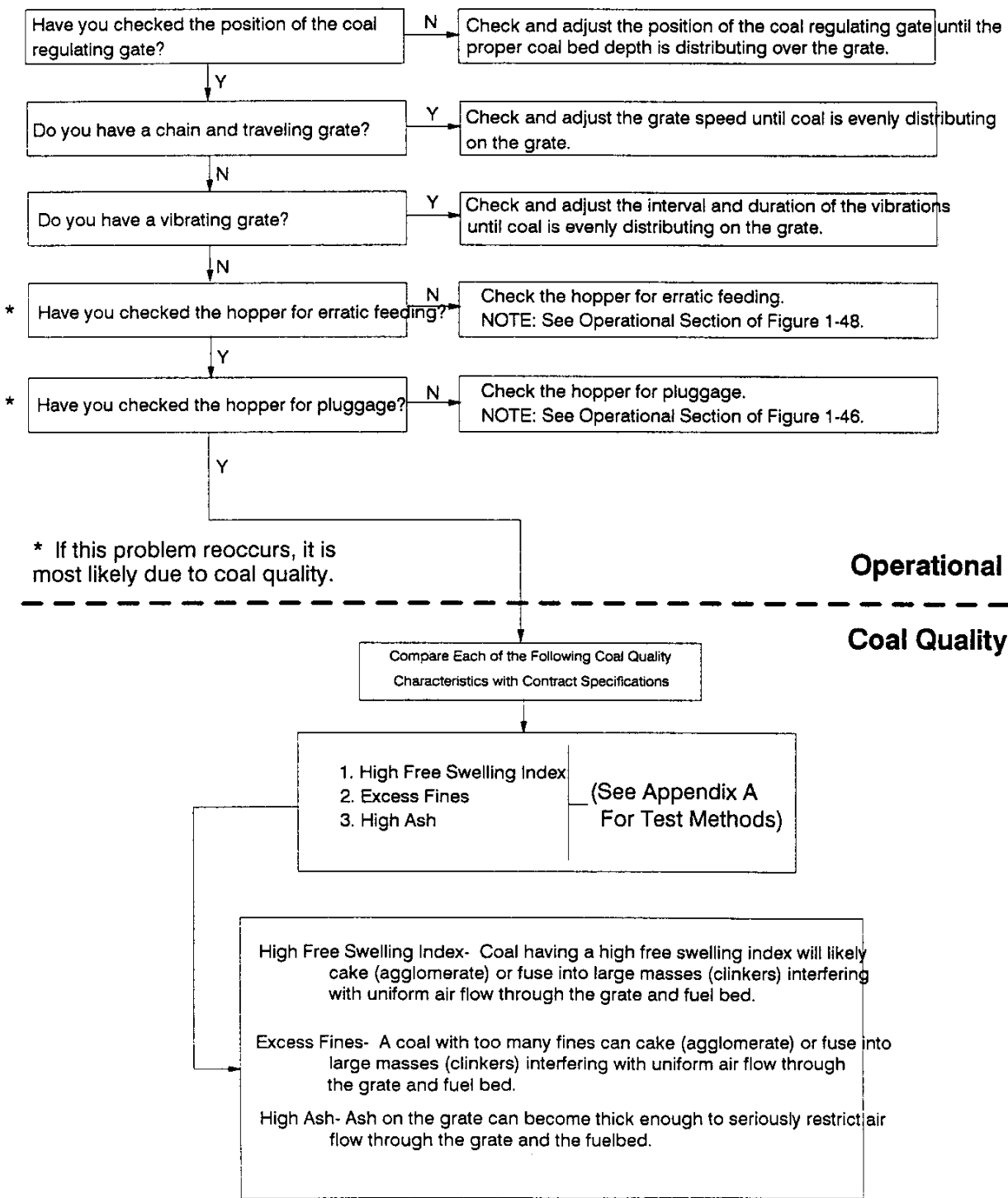


FIG1-57/2

FIGURE 1-58: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Uneven Ash Bed On The Grates
(Chain And Traveling Grate Or Vibrating Grate)

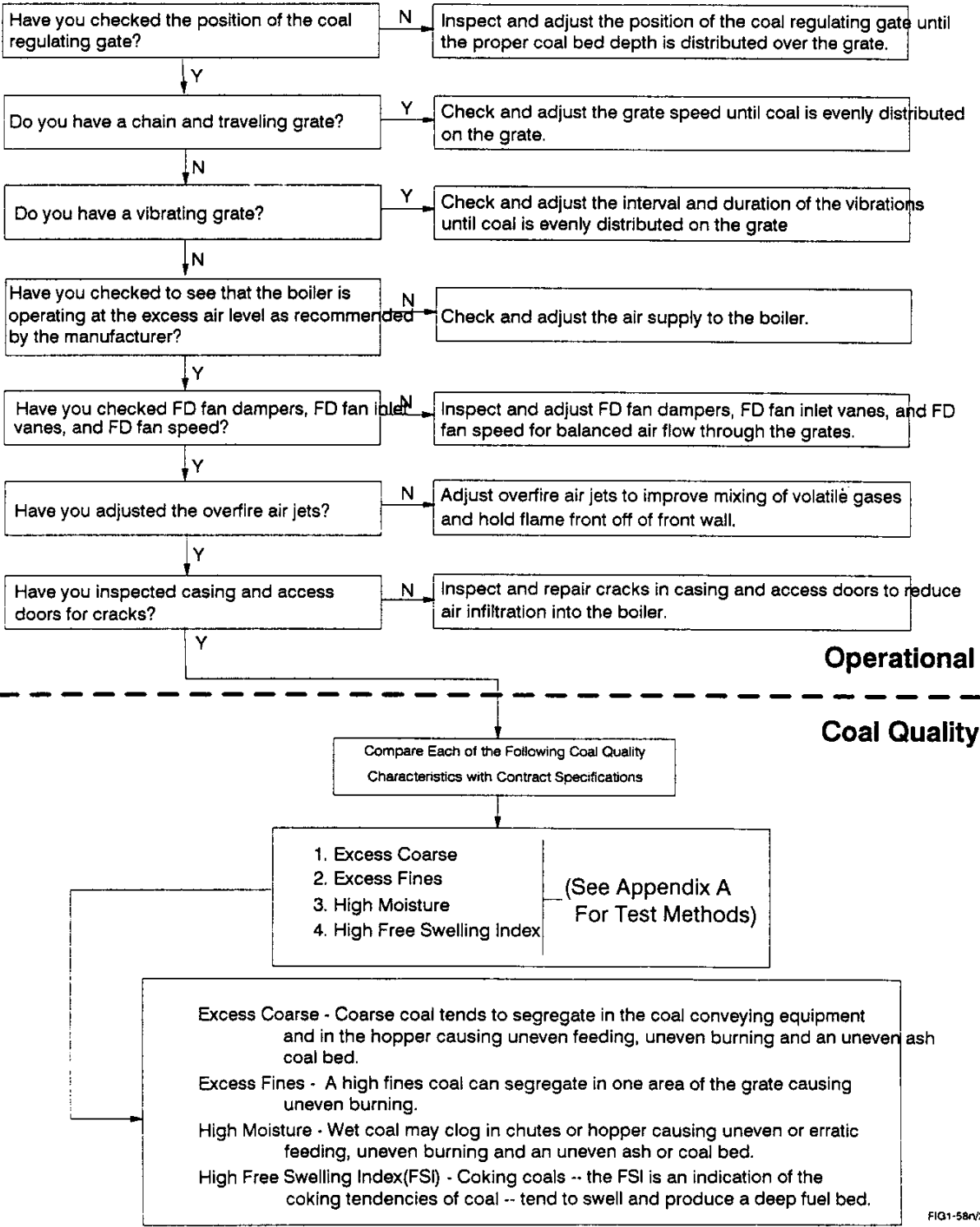


FIG1-58n/2

FIGURE 1-59: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Uneven Coal Bed On The Grates
(Chain and Traveling Grate Or Vibrating Grate)

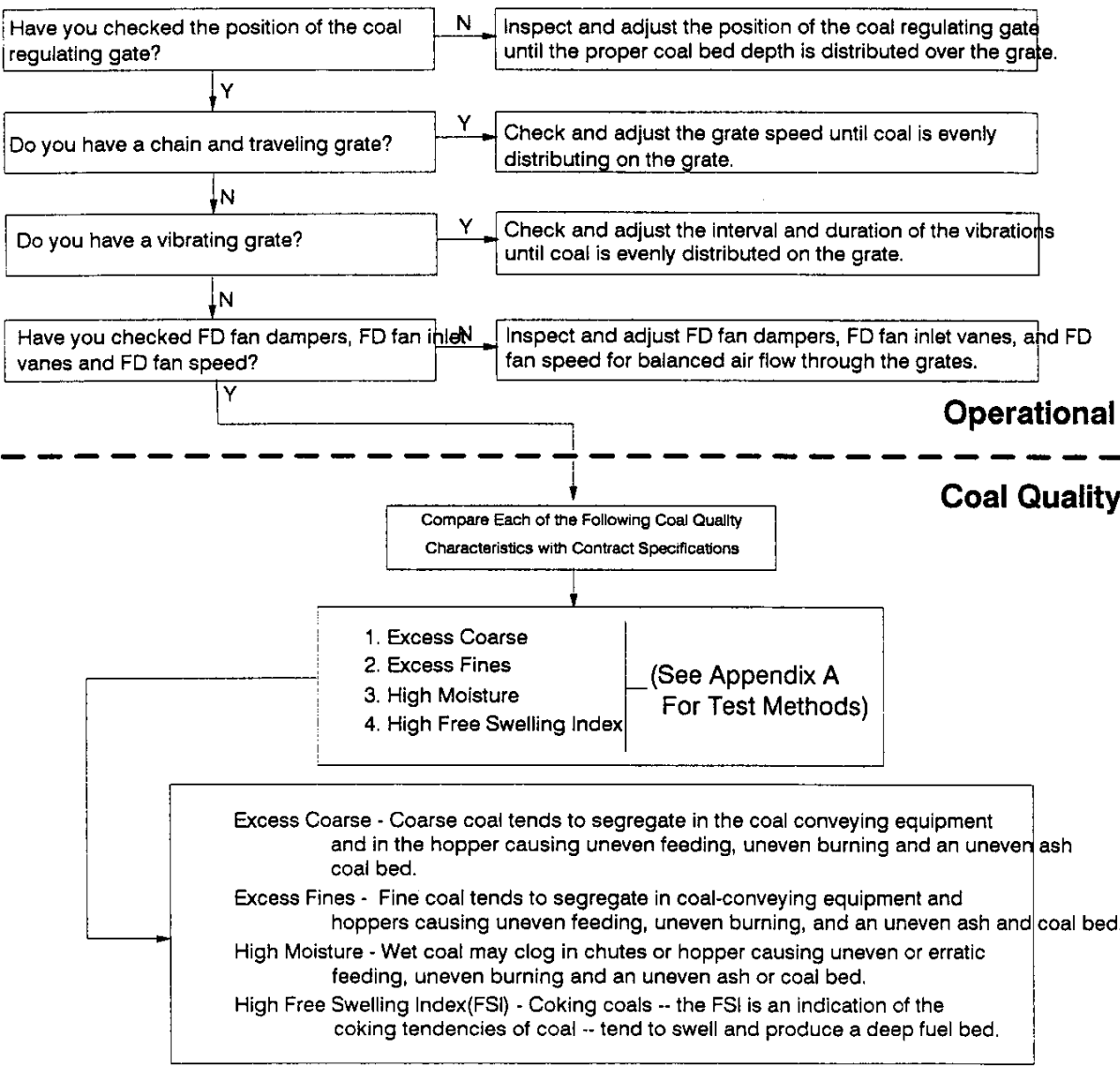


FIG1-59n/2

FIGURE 1-60: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Uneven Burning On The Grates
(Chain And Traveling Grate Or Vibrating Grate)

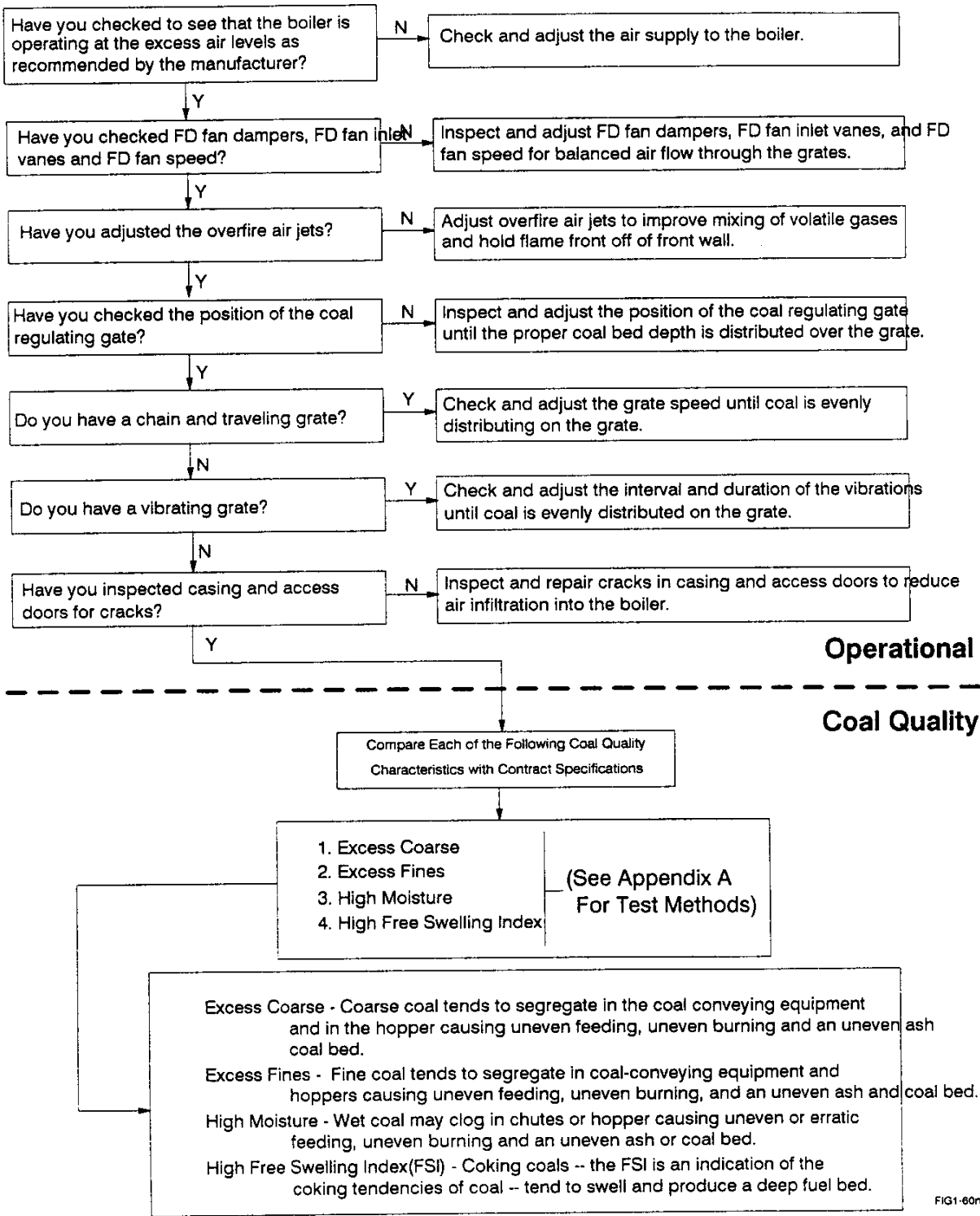


FIG1-60n/2

FIGURE 1-61: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Warped, Burnt, and Cracked Grates
(Chain And Traveling Gate Or Vibrating Gate)

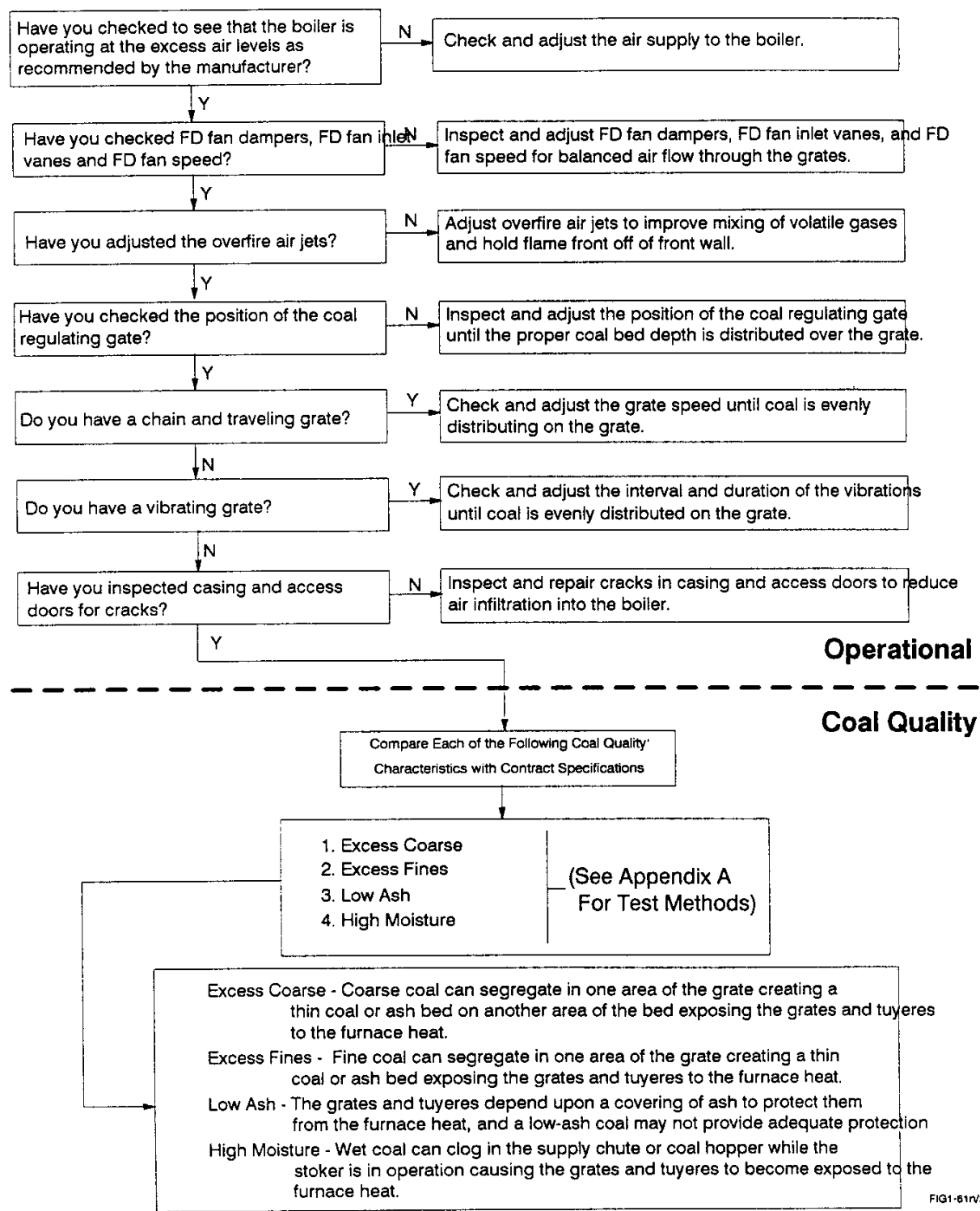


FIG1-61r/2

FIGURE 1-62: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Clinkers On The Grates
(Chain And Traveling Grate Or Vibrating Grate)

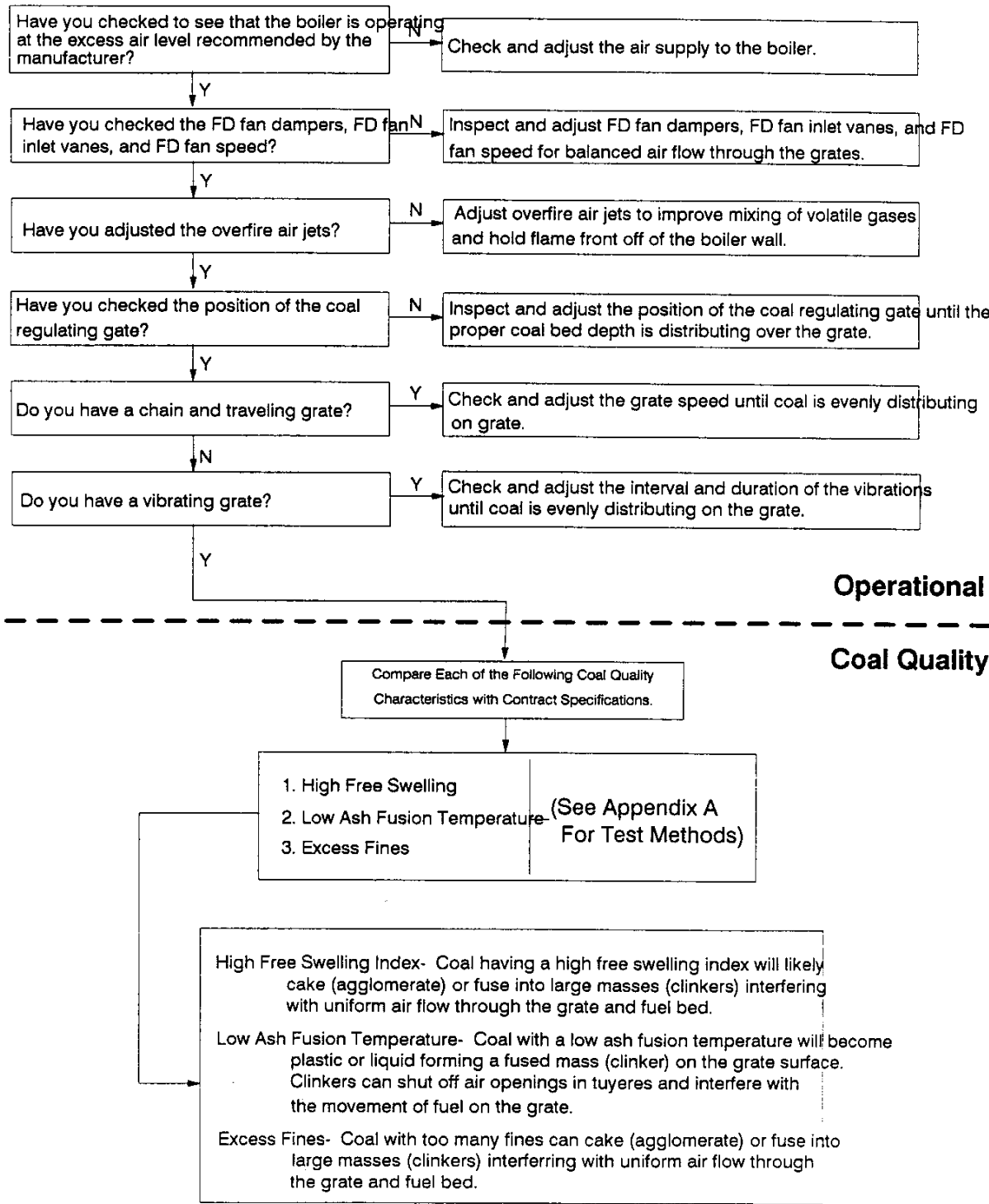


FIG1-62N/2

FIGURE 1-63: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout On The Grate
(Chain And Traveling Grate Or Vibrating Grate)

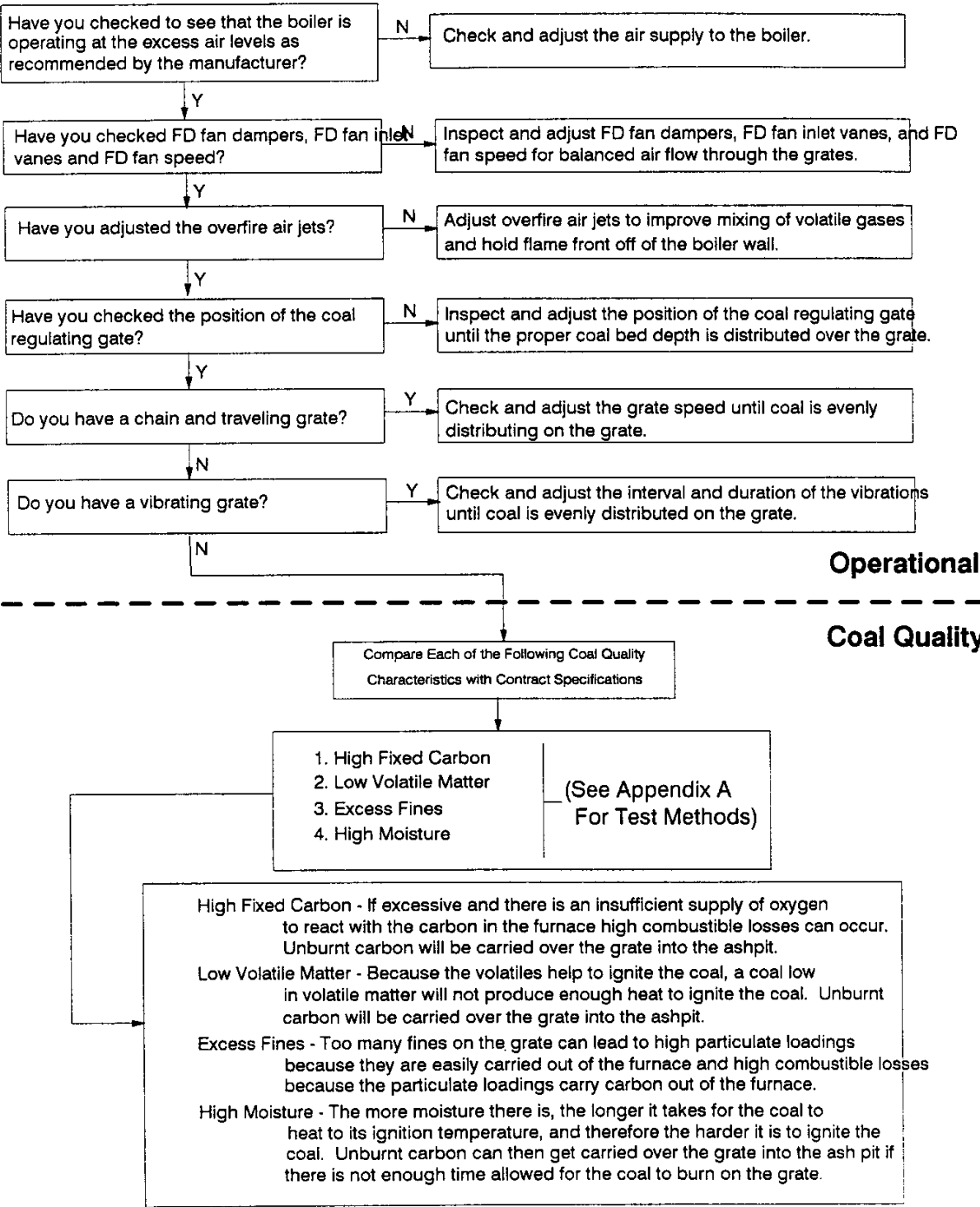


FIG1-63/2

FIGURE 1-64: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Corrosion Of The Refractory Surfaces

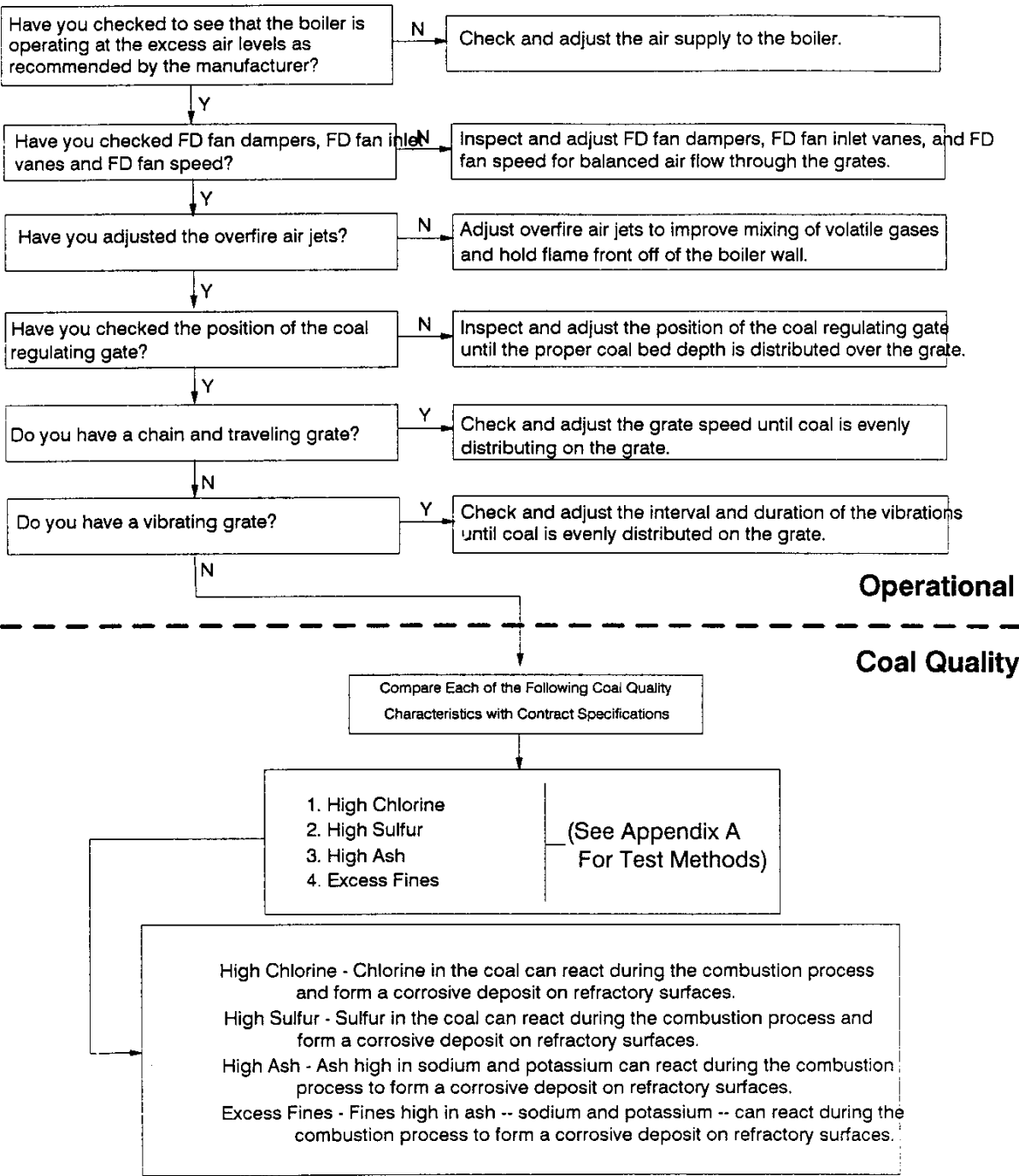


FIG1-64v2

FIGURE 1-65: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of The Refractory Surfaces

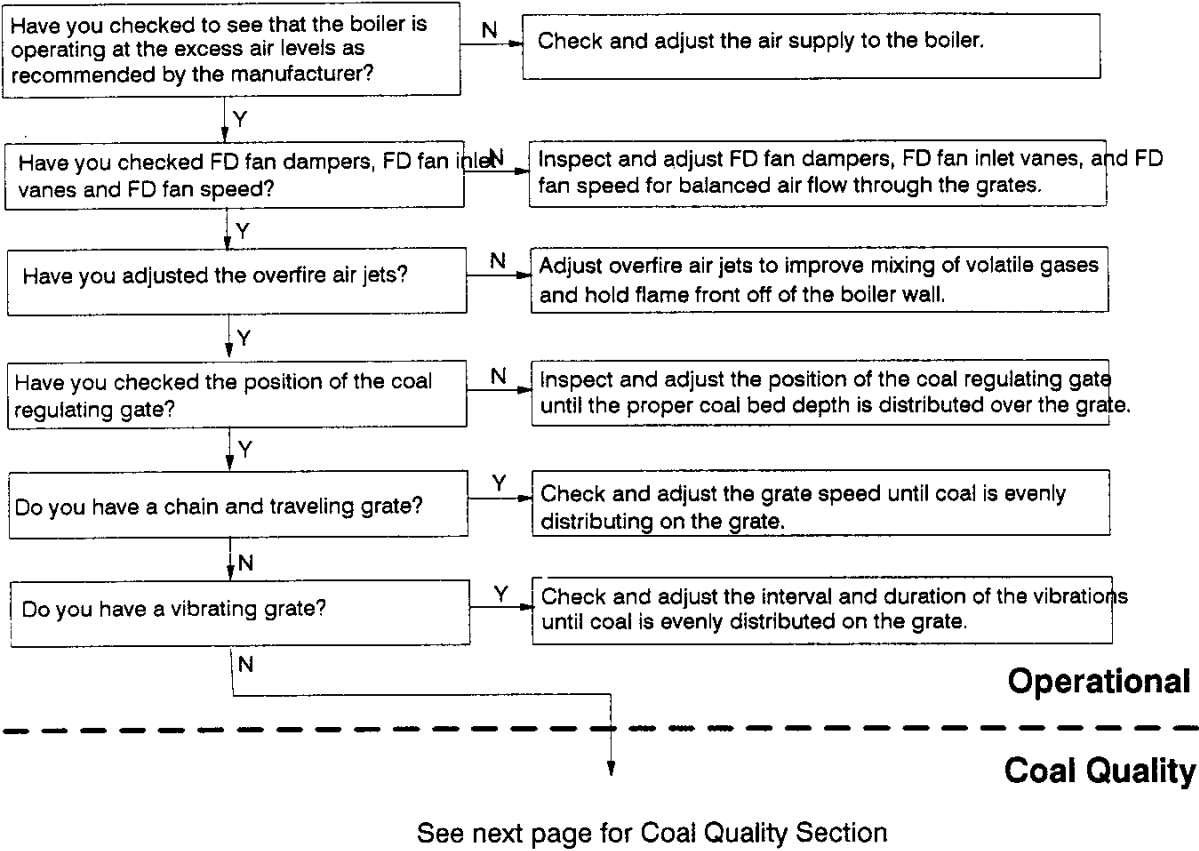


FIGURE 1-65 (continued): OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of Refractory Surfaces

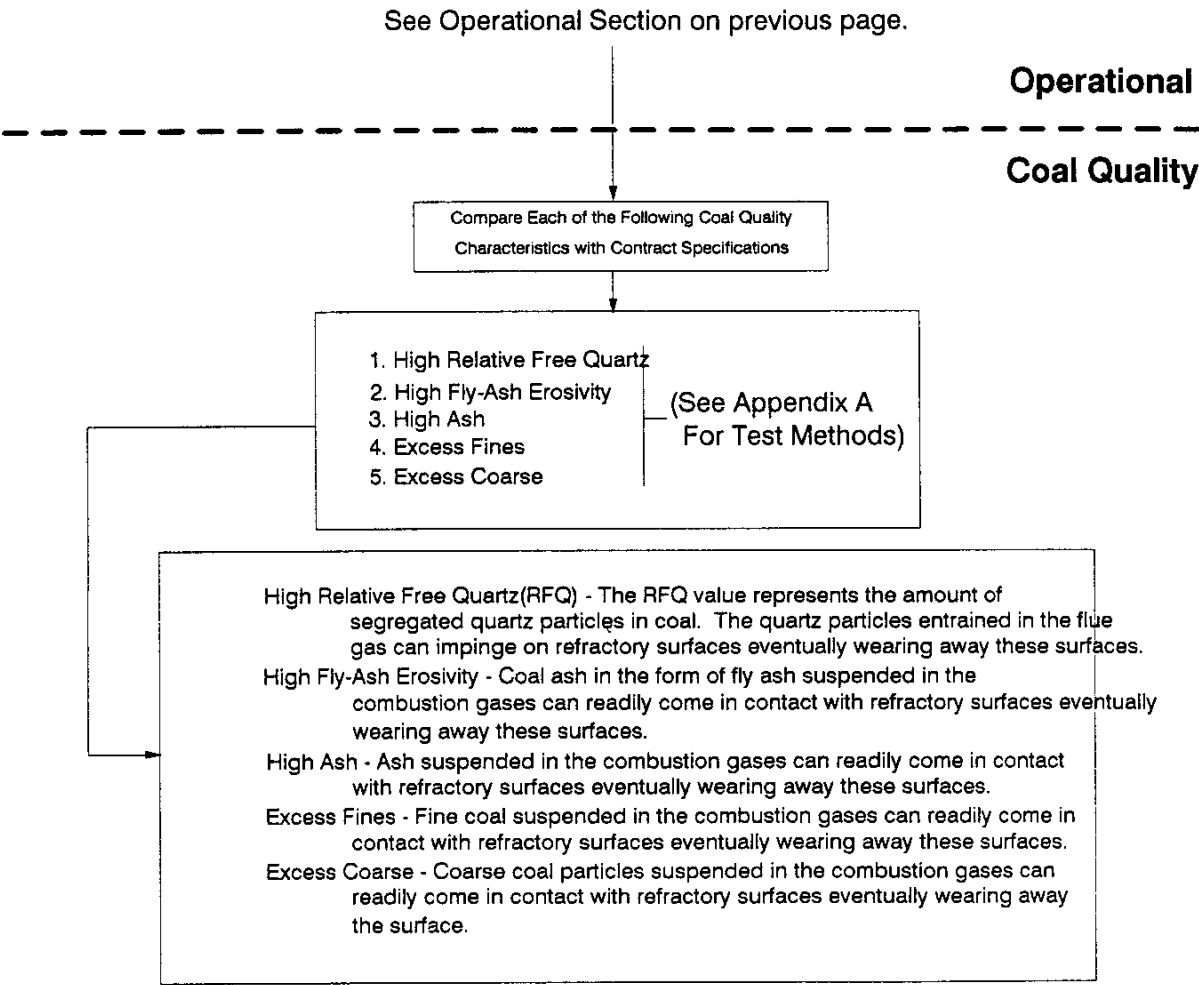


FIGURE 1-66: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Slagging/Spalling Of Refractory Surfaces

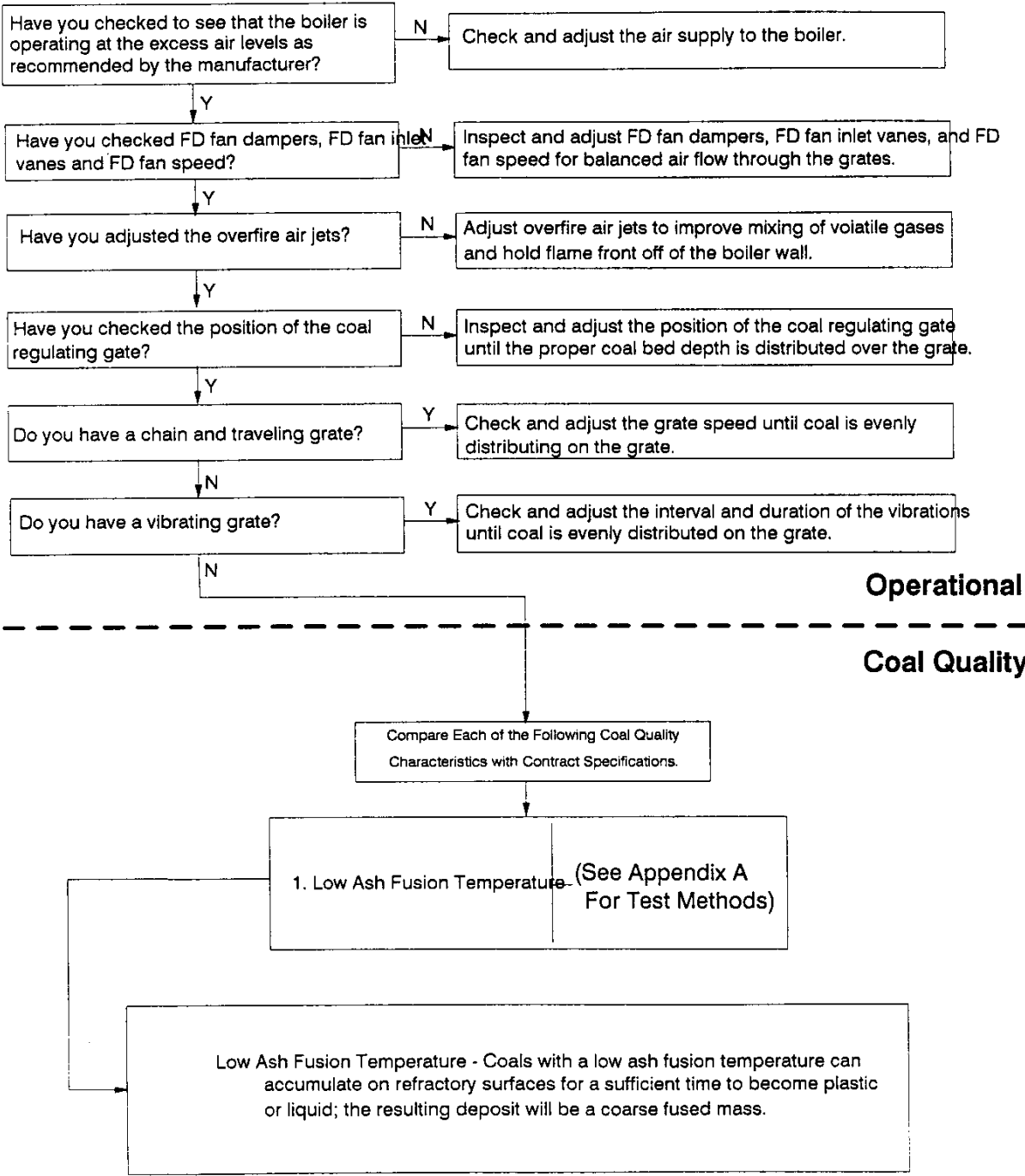


FIG1-66n/2

FIGURE 1-67: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Corrosion Of The Heat Transfer Surfaces
(Boiler Tubes and Water Walls)

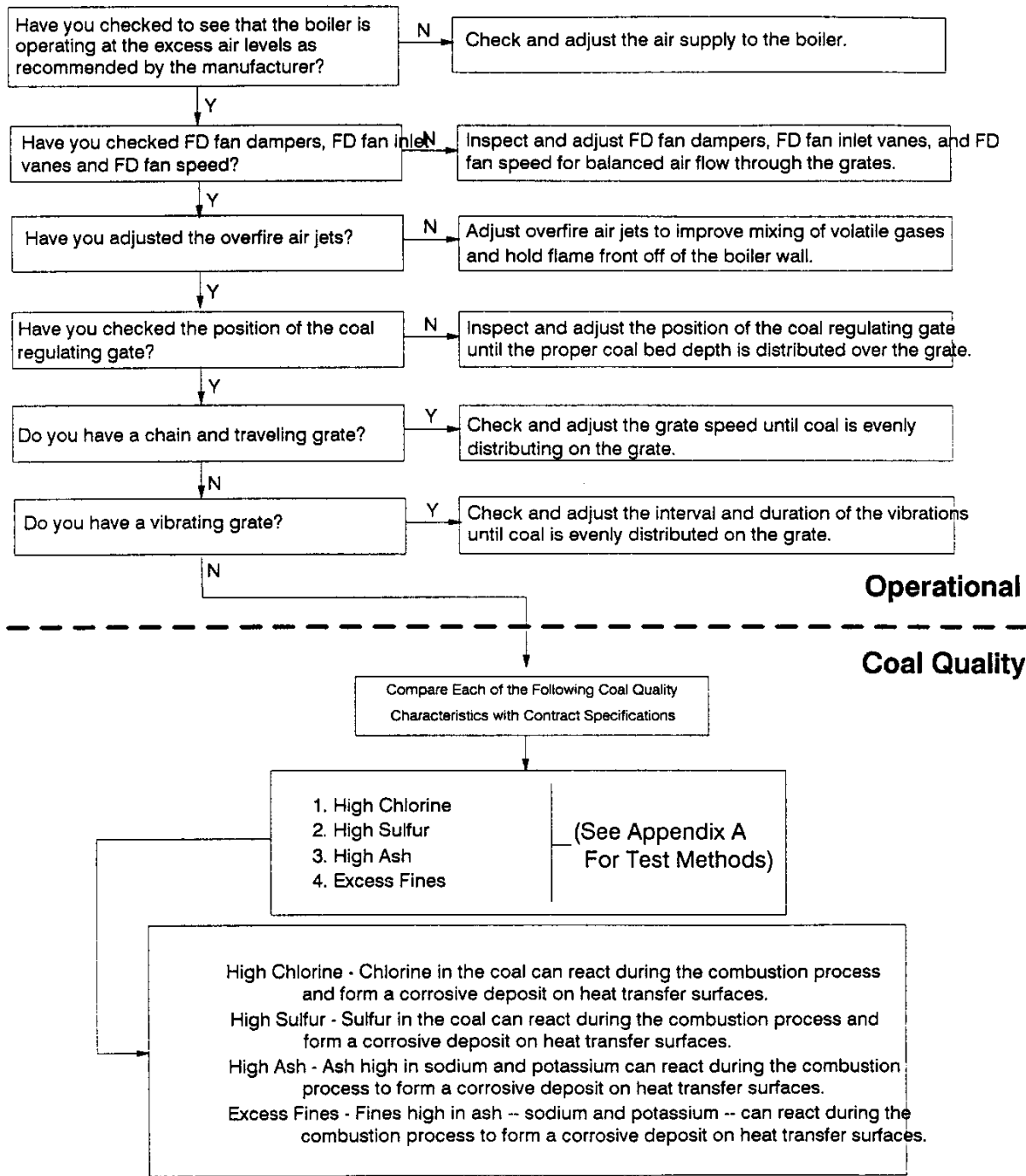


FIG1-67v2

FIGURE 1-68: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of The Heat Transfer Surfaces
(Boiler Tubes and Water Walls)

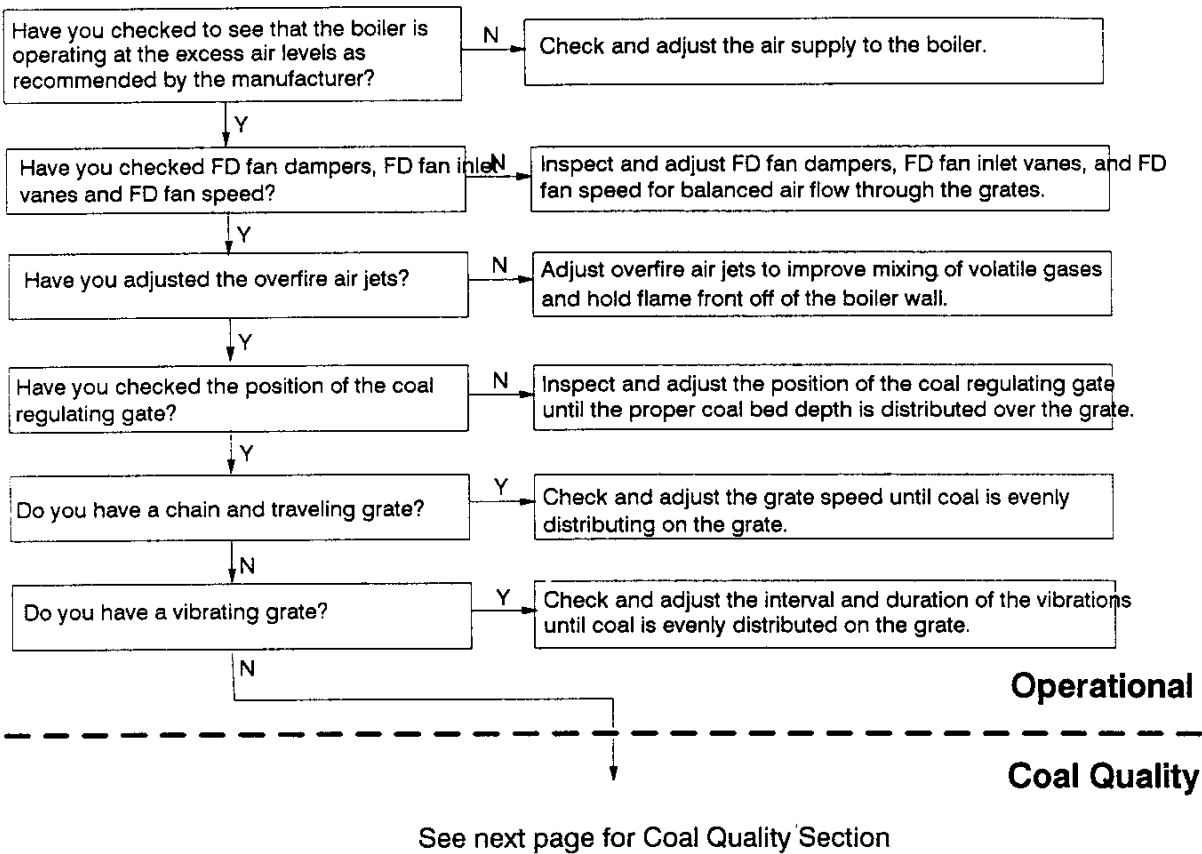


FIGURE 1-68 (continued): OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of Heat Transfer Surfaces
(Boiler Tubes and Water Walls)

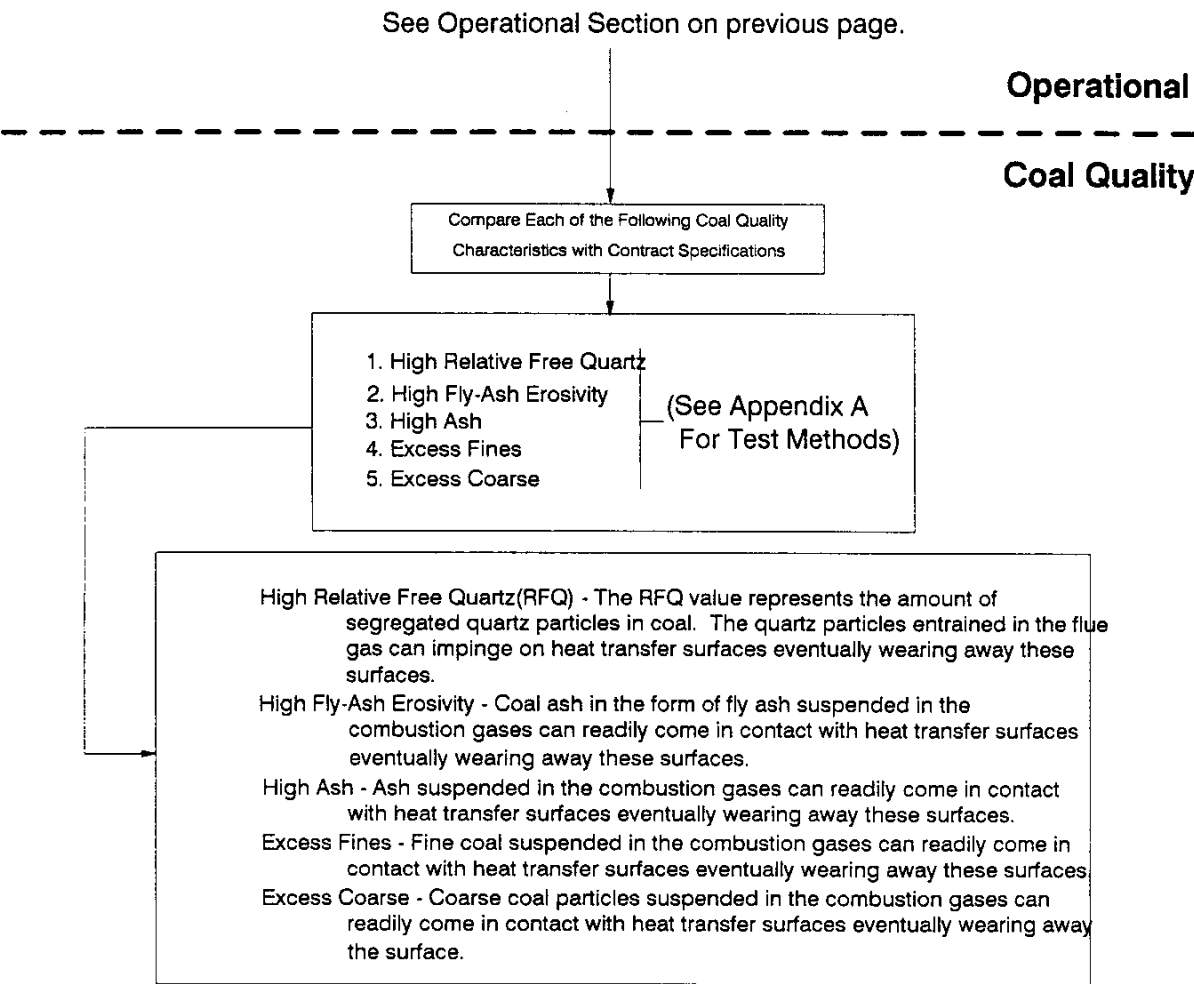


FIGURE 1-69: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Slagging Of Heat Transfer Surfaces
(Boiler Tubes and Water Walls)

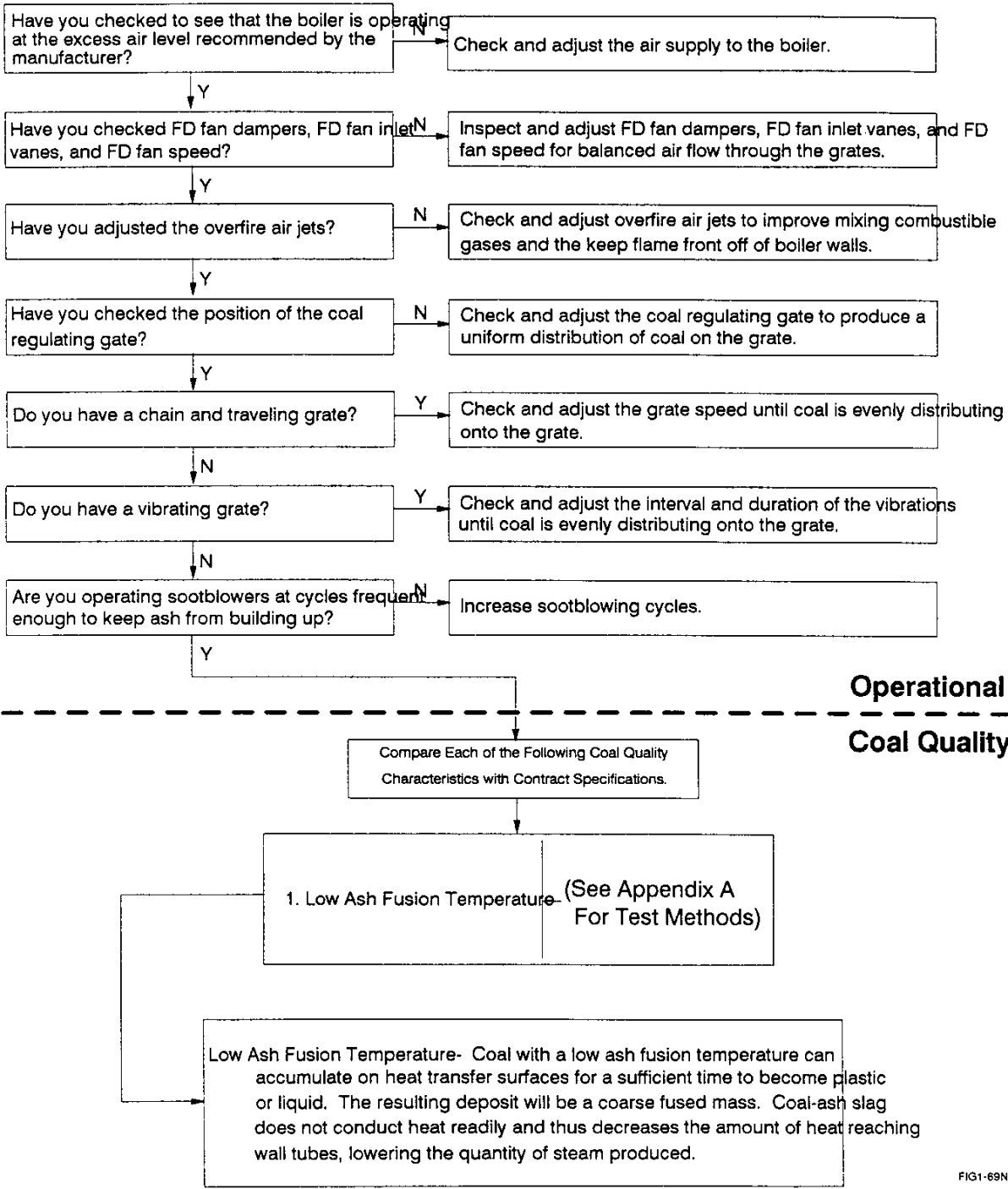


FIG1-69N/2

FIGURE 1-70: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Fouling Of Heat Transfer Surfaces
(Boiler Tubes and Water Walls)

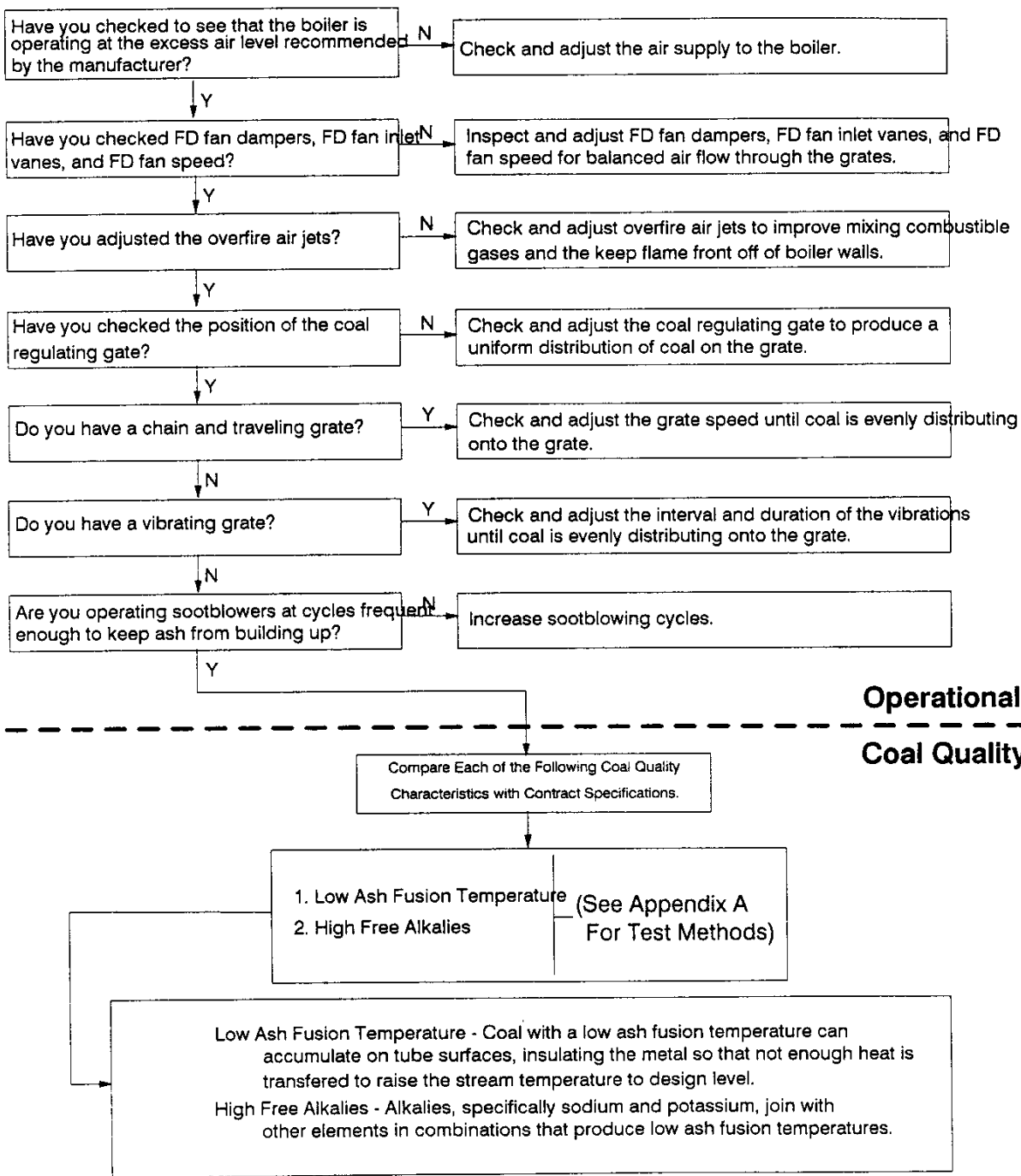


FIG1-70N/2

FIGURE 1-71: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Corrosion Of The Baffles

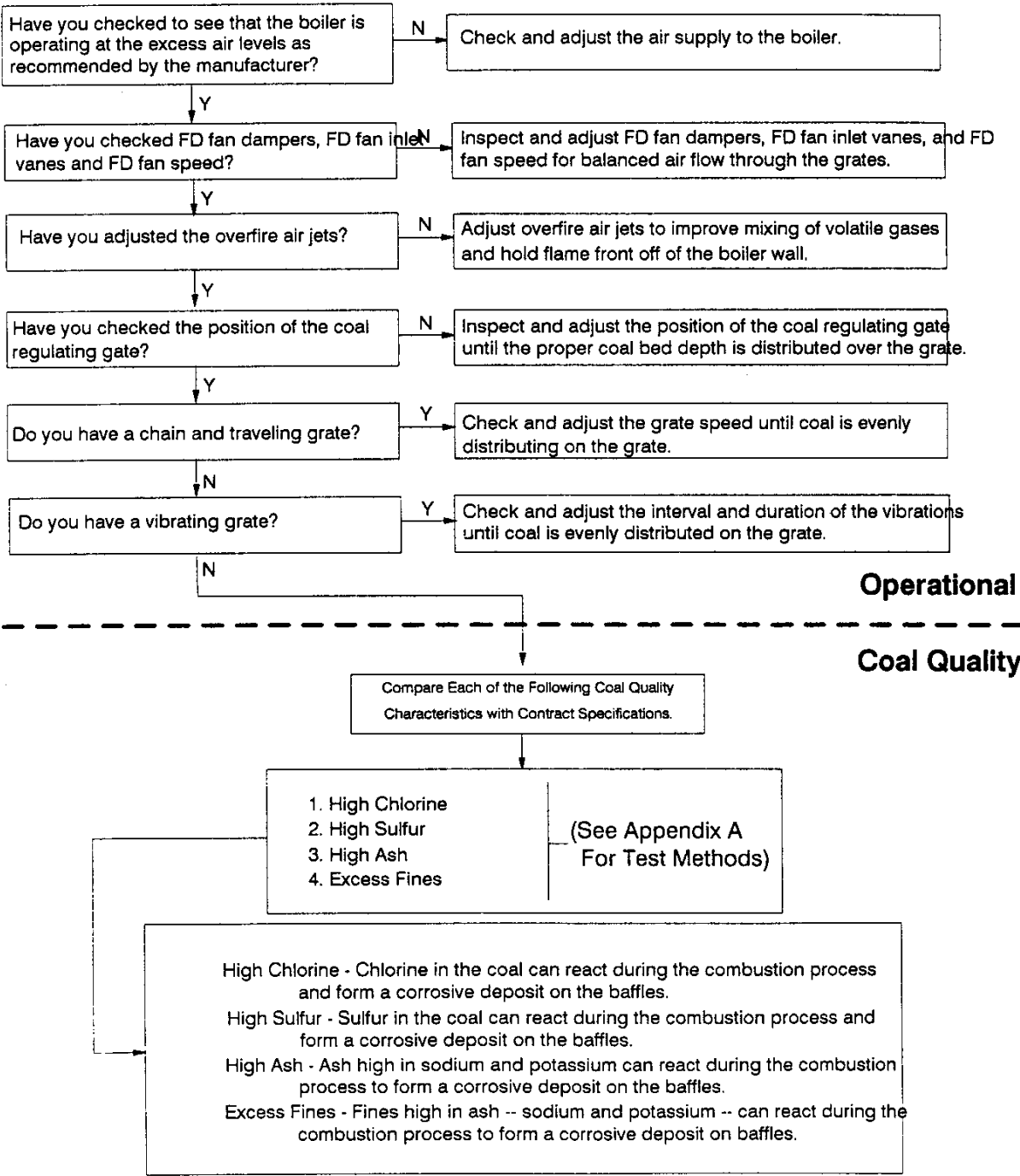
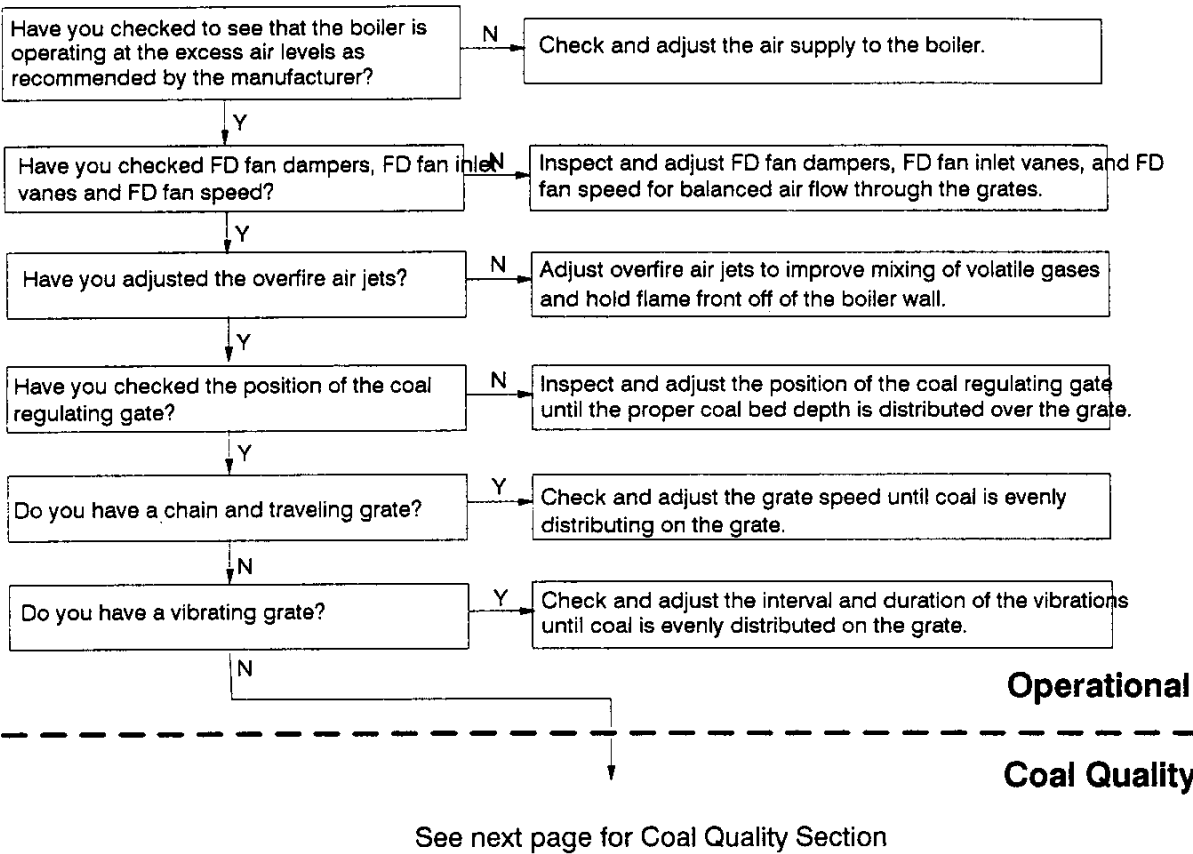


FIGURE 1-72: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of The Heat Transfer Surfaces
(Baffles)



**FIGURE 1-72 (continued): OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of Heat Transfer Surfaces
(Baffles)**

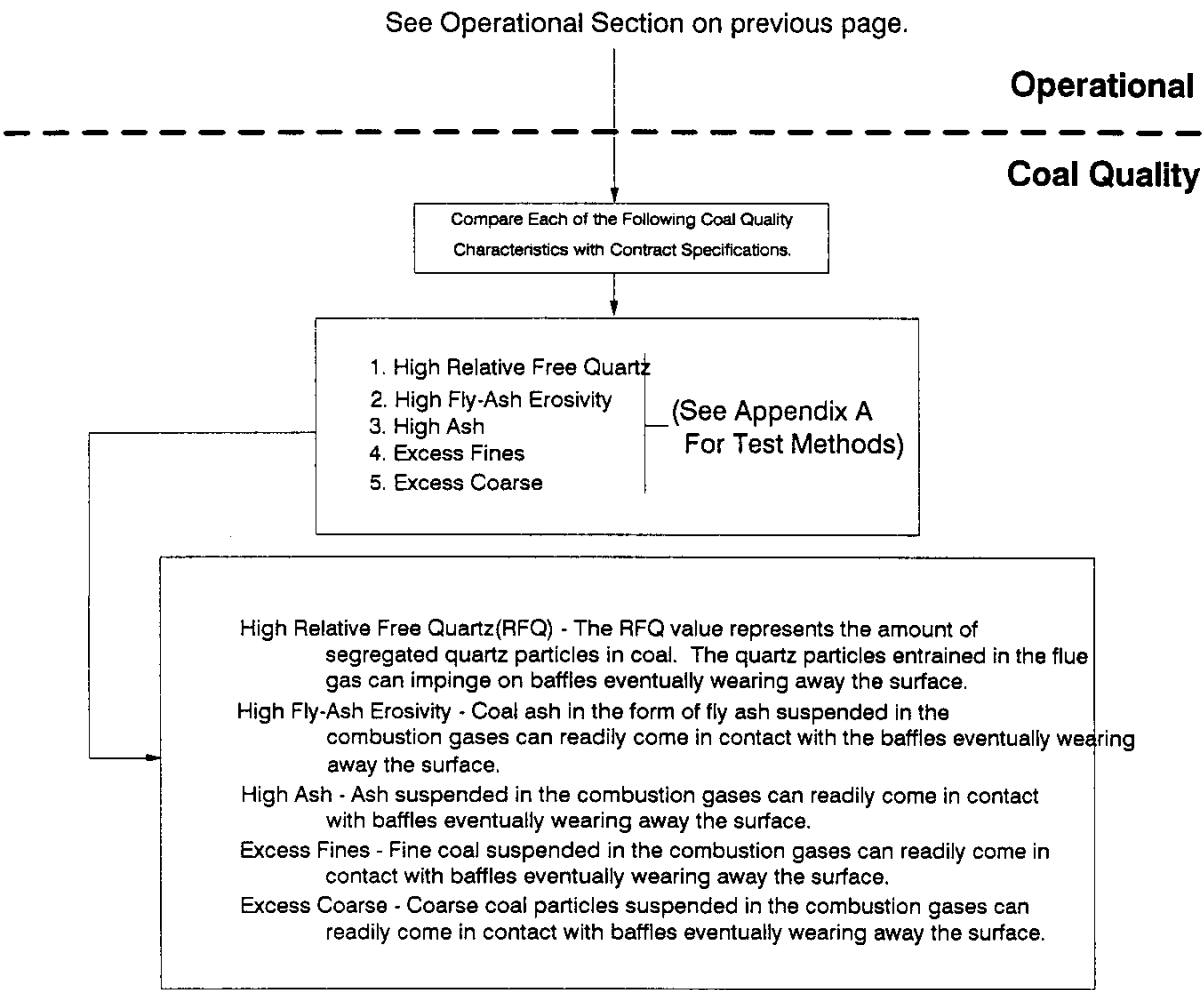


FIGURE 1-73: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Slagging Of Heat Transfer Surfaces
(Baffles)

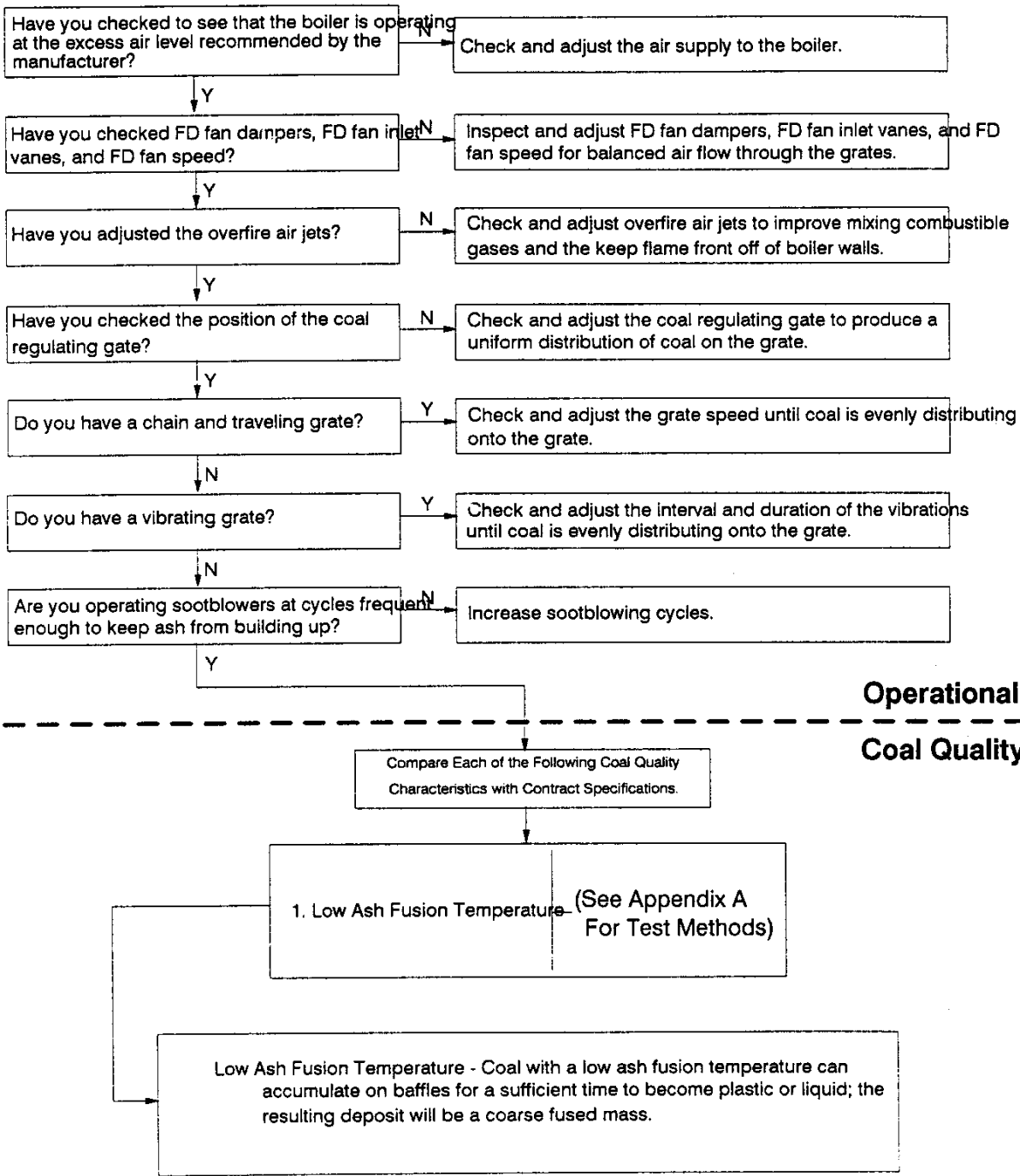


FIG1-73N/2

FIGURE 1-74: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Fouling Of Heat Transfer Surfaces
(Baffles)

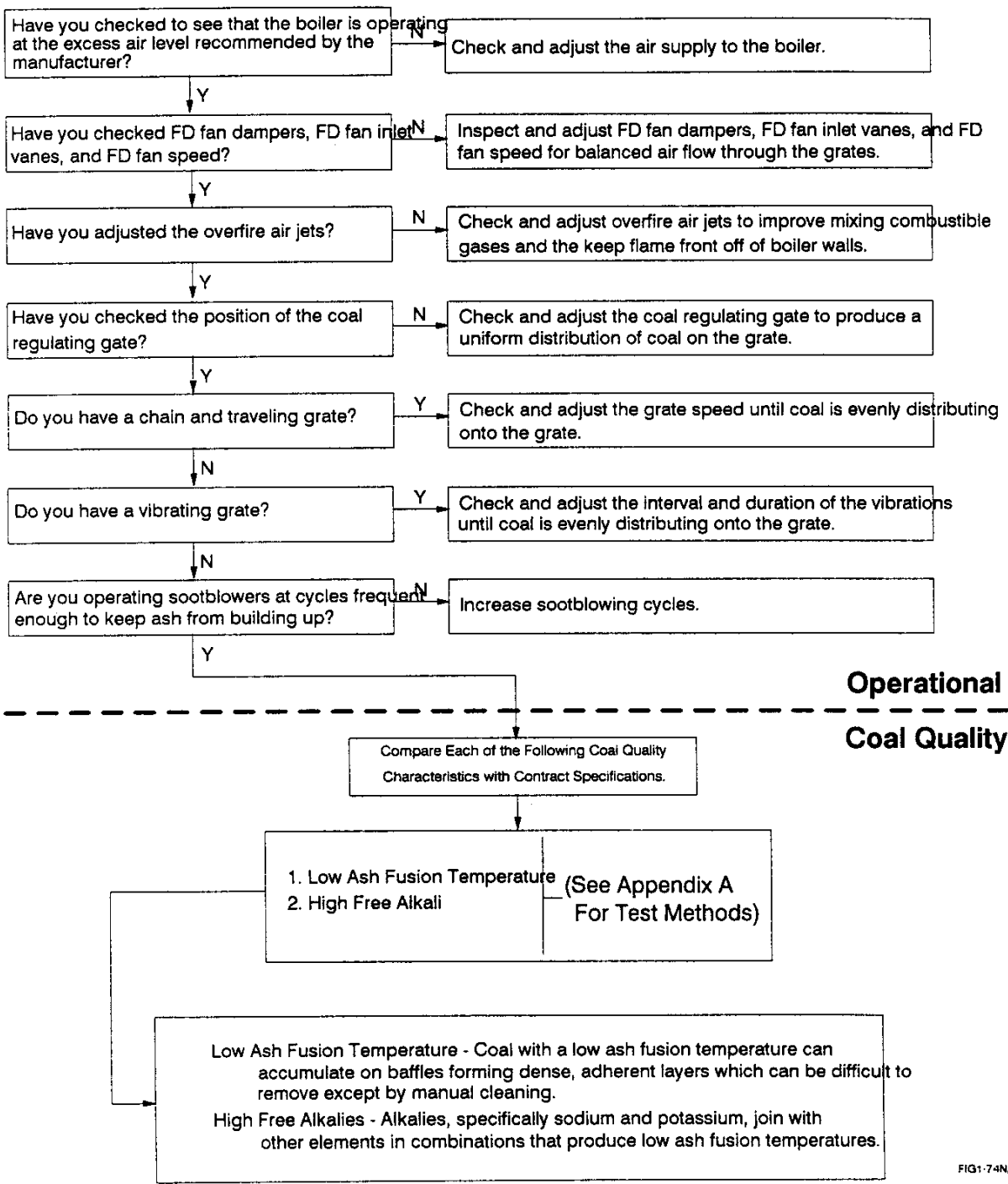


FIG1-74N/2

FIGURE 1-75: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity And Inability To Meet Load
(Forced Draft Fan)

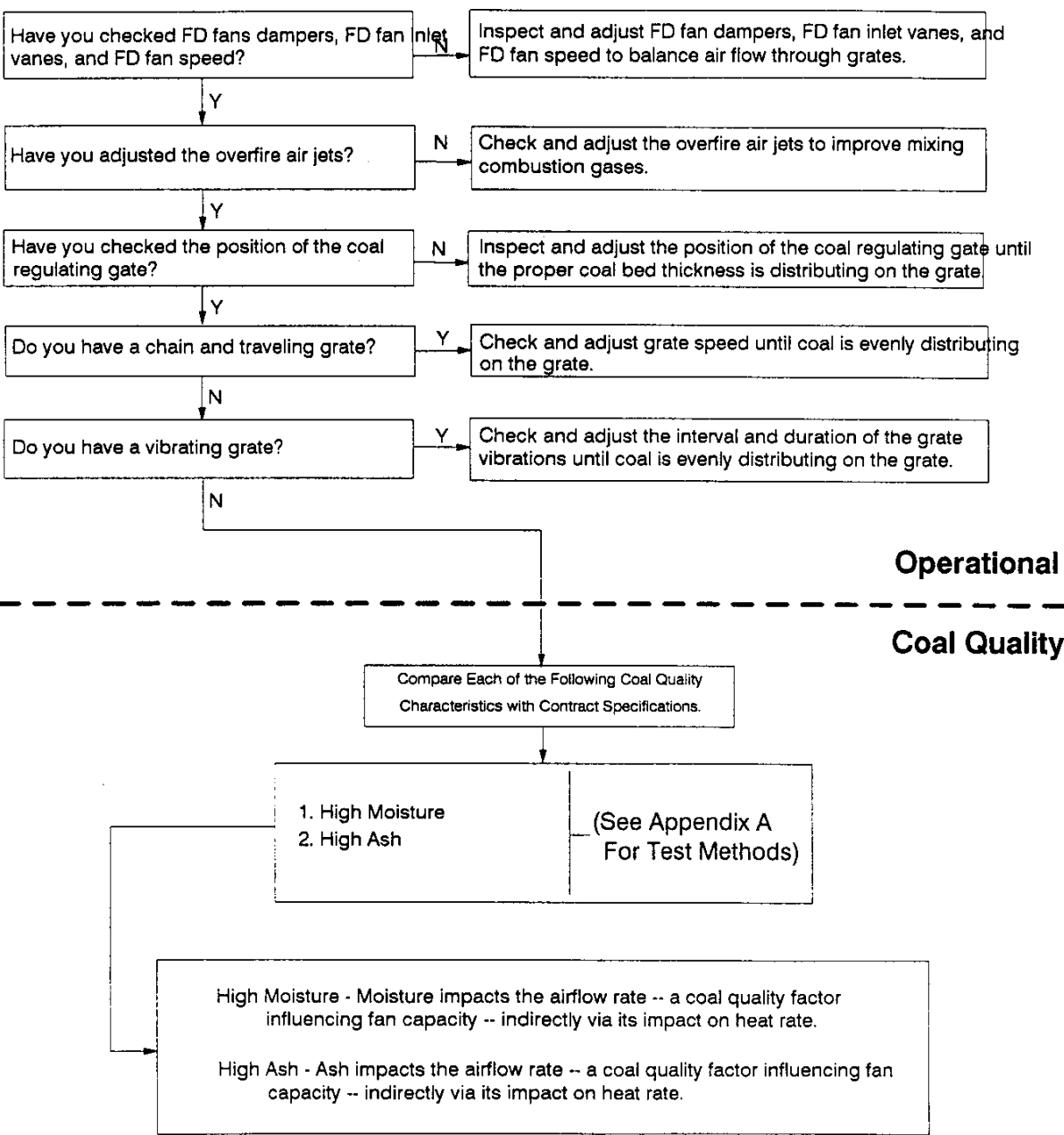


FIG1-75n/3

FIGURE 1-76: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Smoking Around The Forced Draft Fan

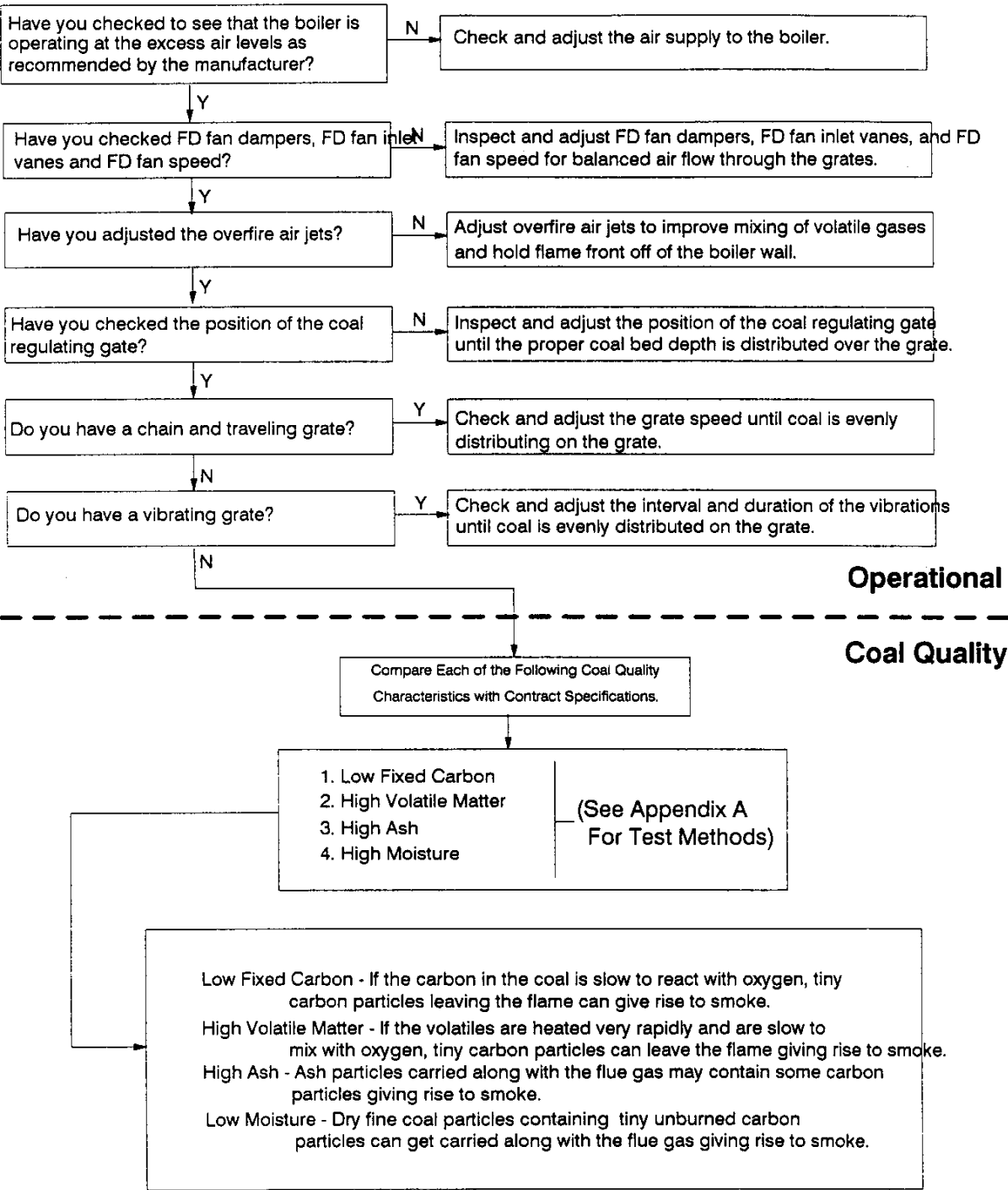


FIGURE 1-77: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Insufficient Capacity And Inability To Meet Load
(Induced Draft Fan)

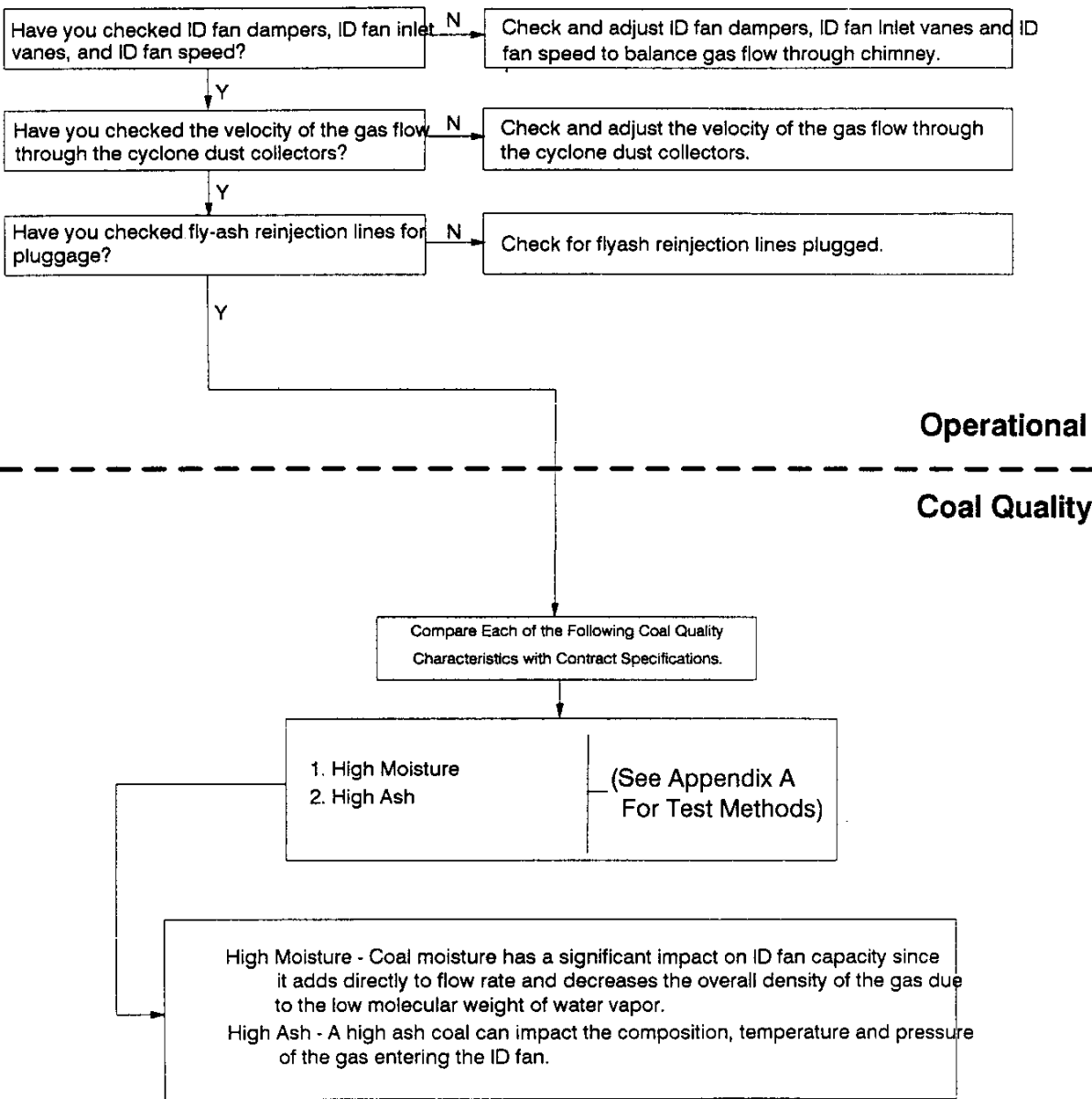


FIG1-77rV3

FIGURE 1-78: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Corrosion Of The Induced Draft Fan

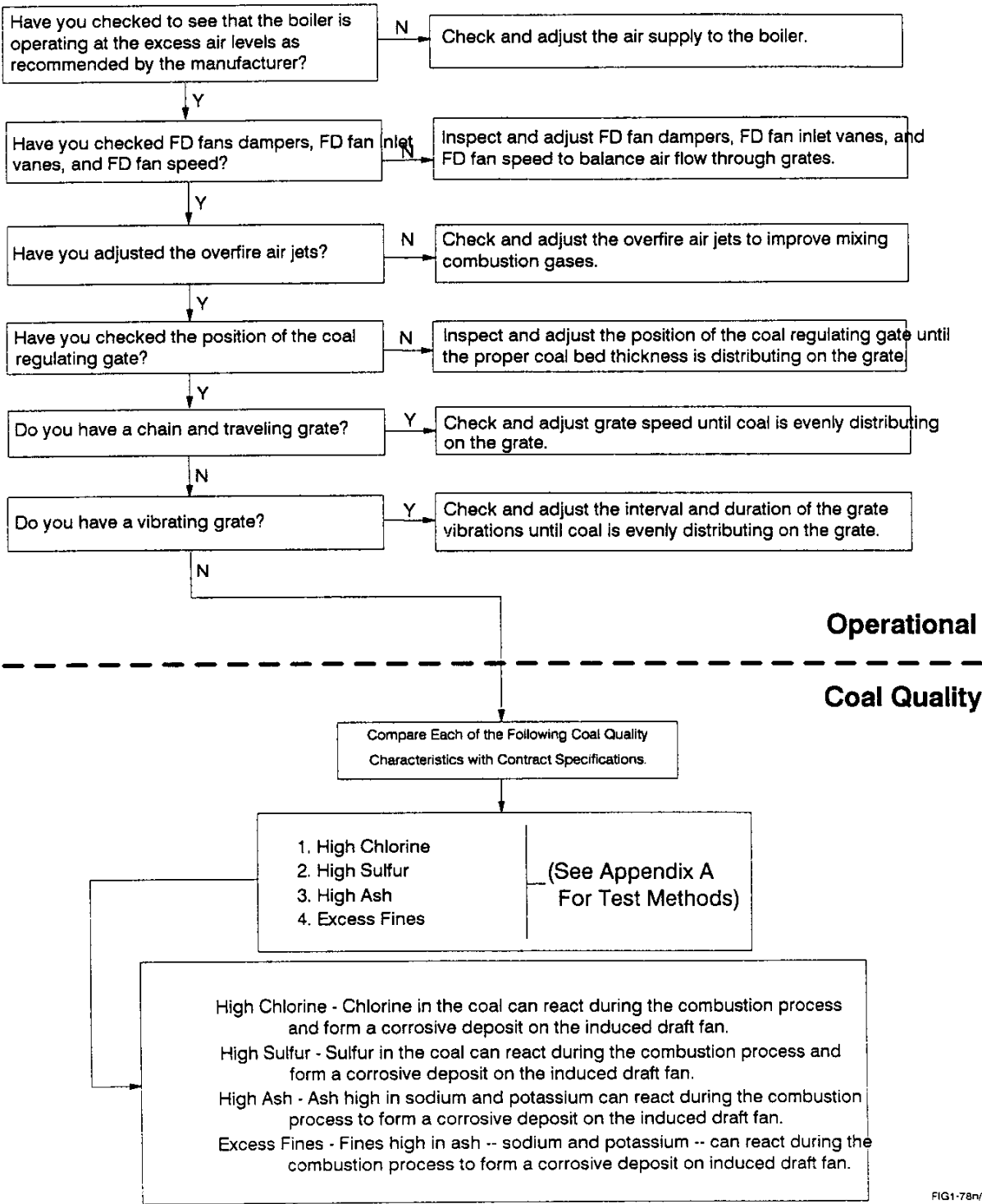


FIG1-78n/3

FIGURE 1-79: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Smoking From The Induced Draft Fan

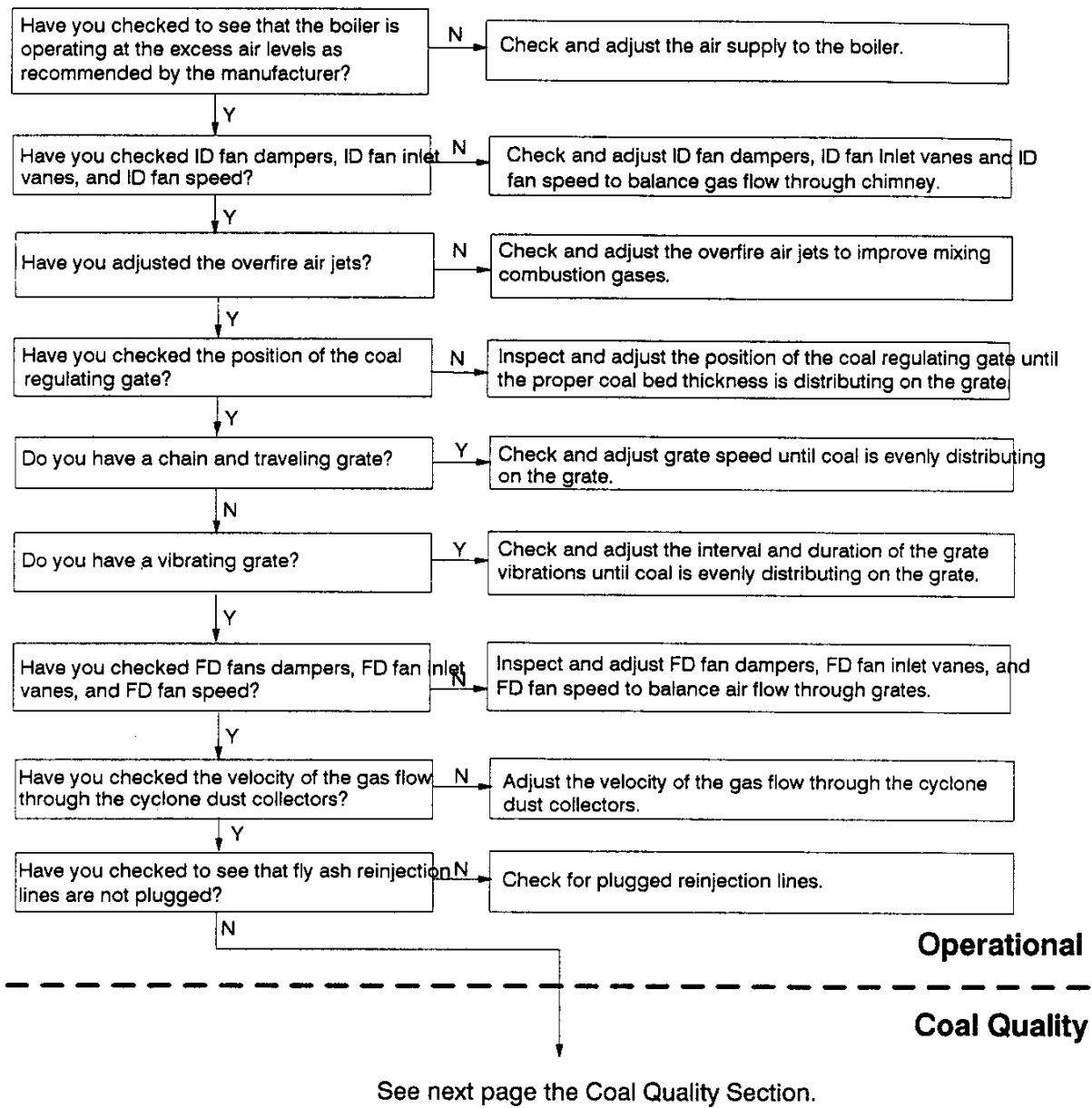


FIG1-79v3

FIGURE 1-79 (continued): OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Smoking From The Induced Draft Fan

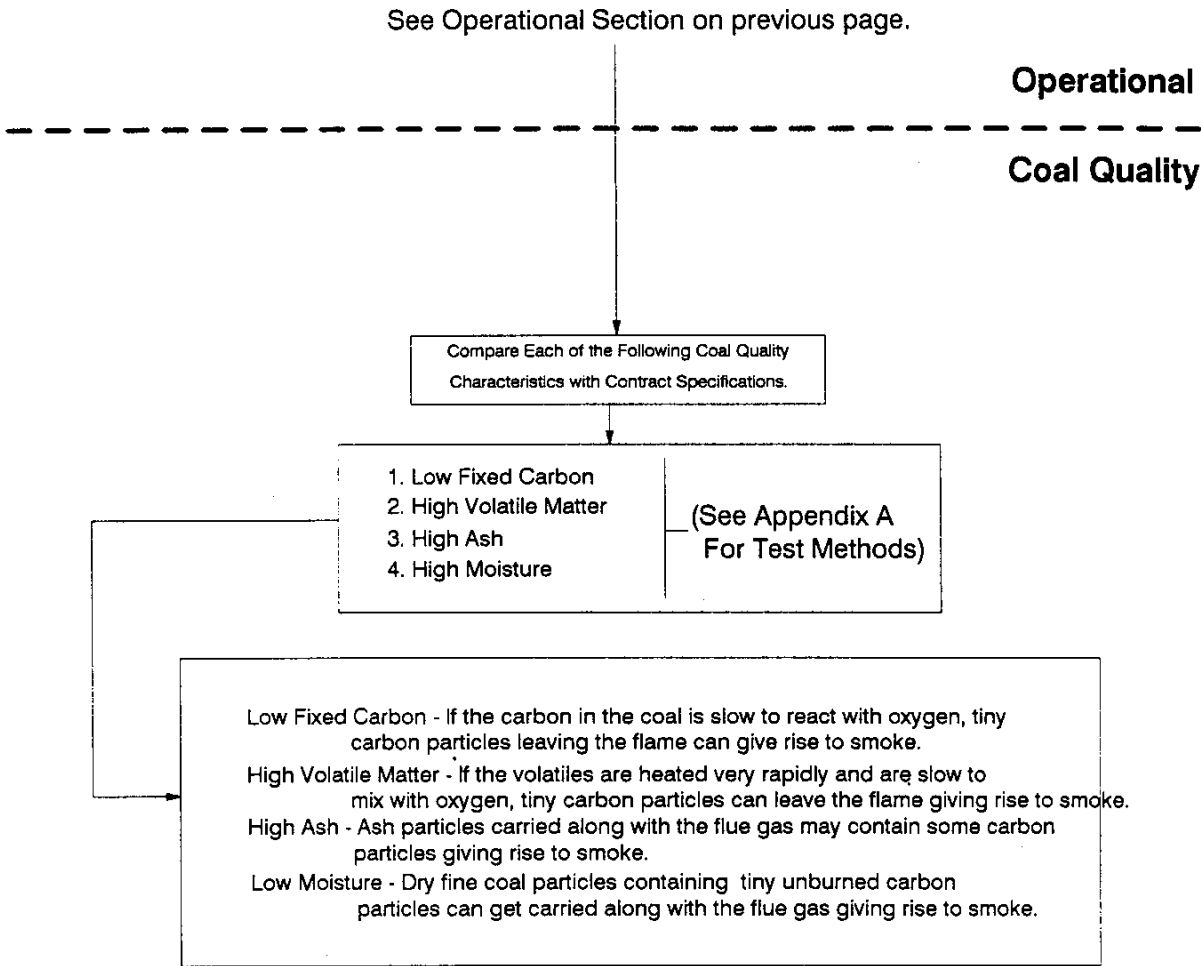


FIGURE 1-80: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of The Induced Draft Fan

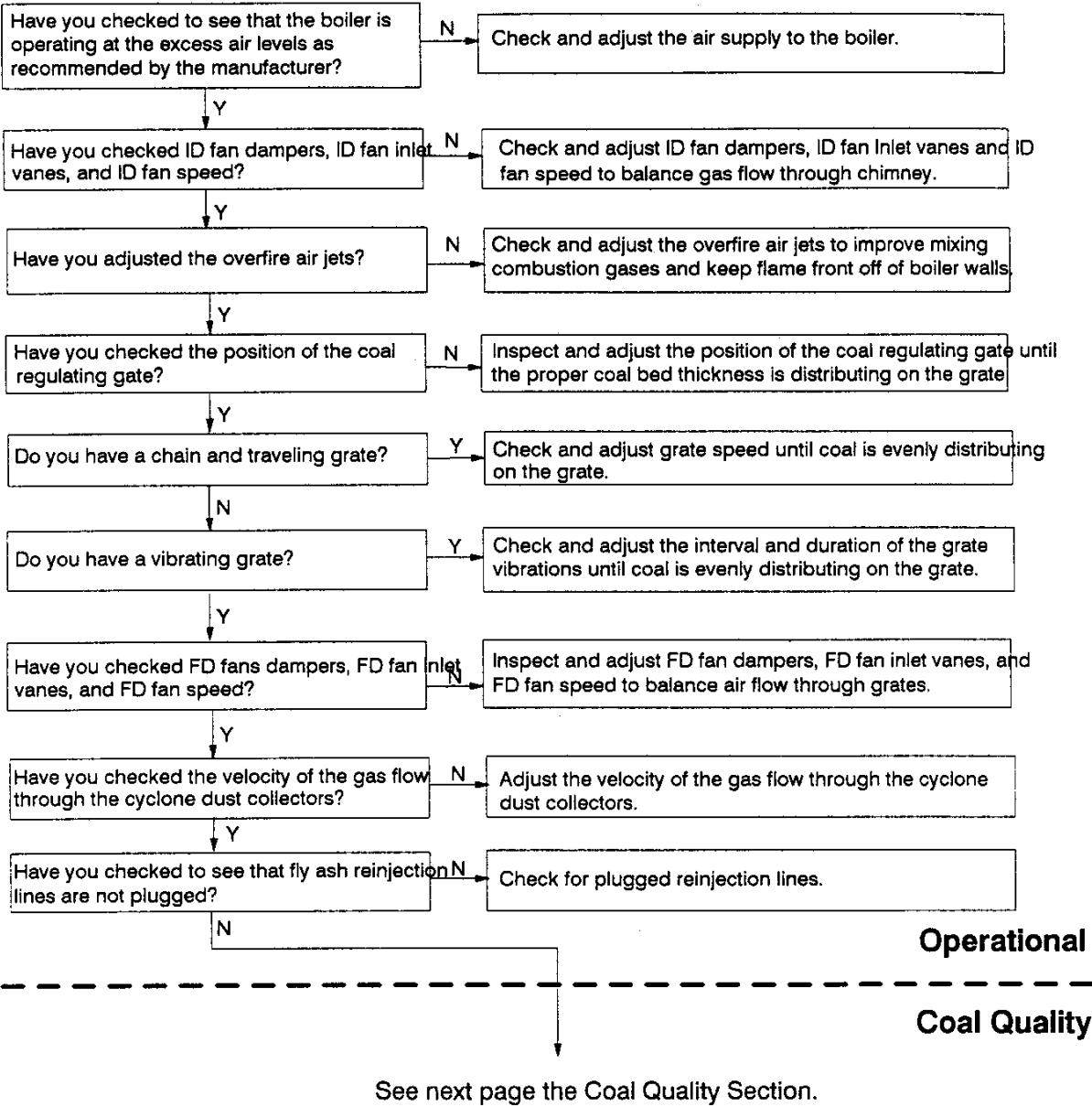


FIGURE 1-80 (continued): OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of The Induced Draft Fan

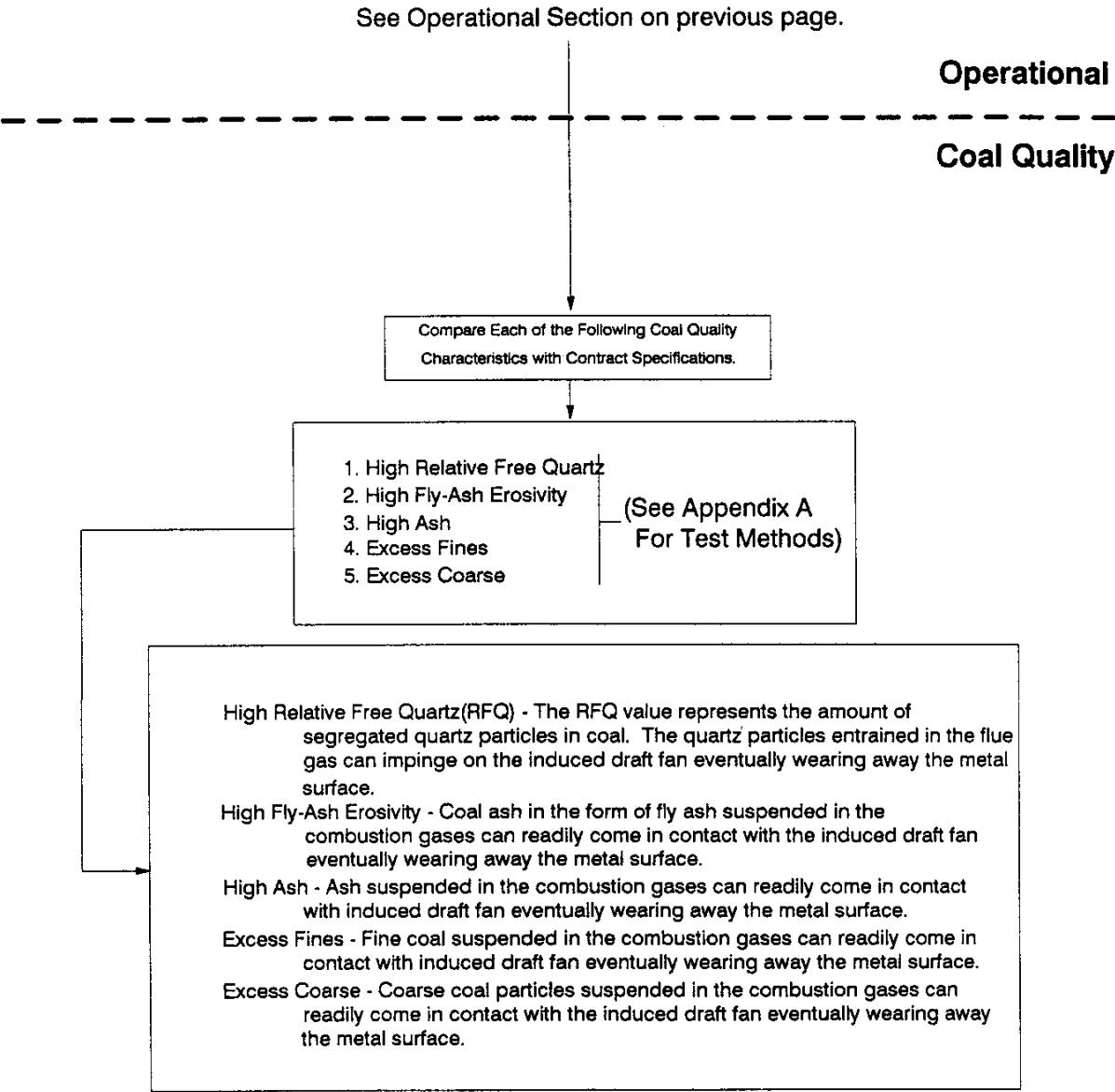


FIGURE 1-81: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout From The Particulate Removal System
(Baghouse)

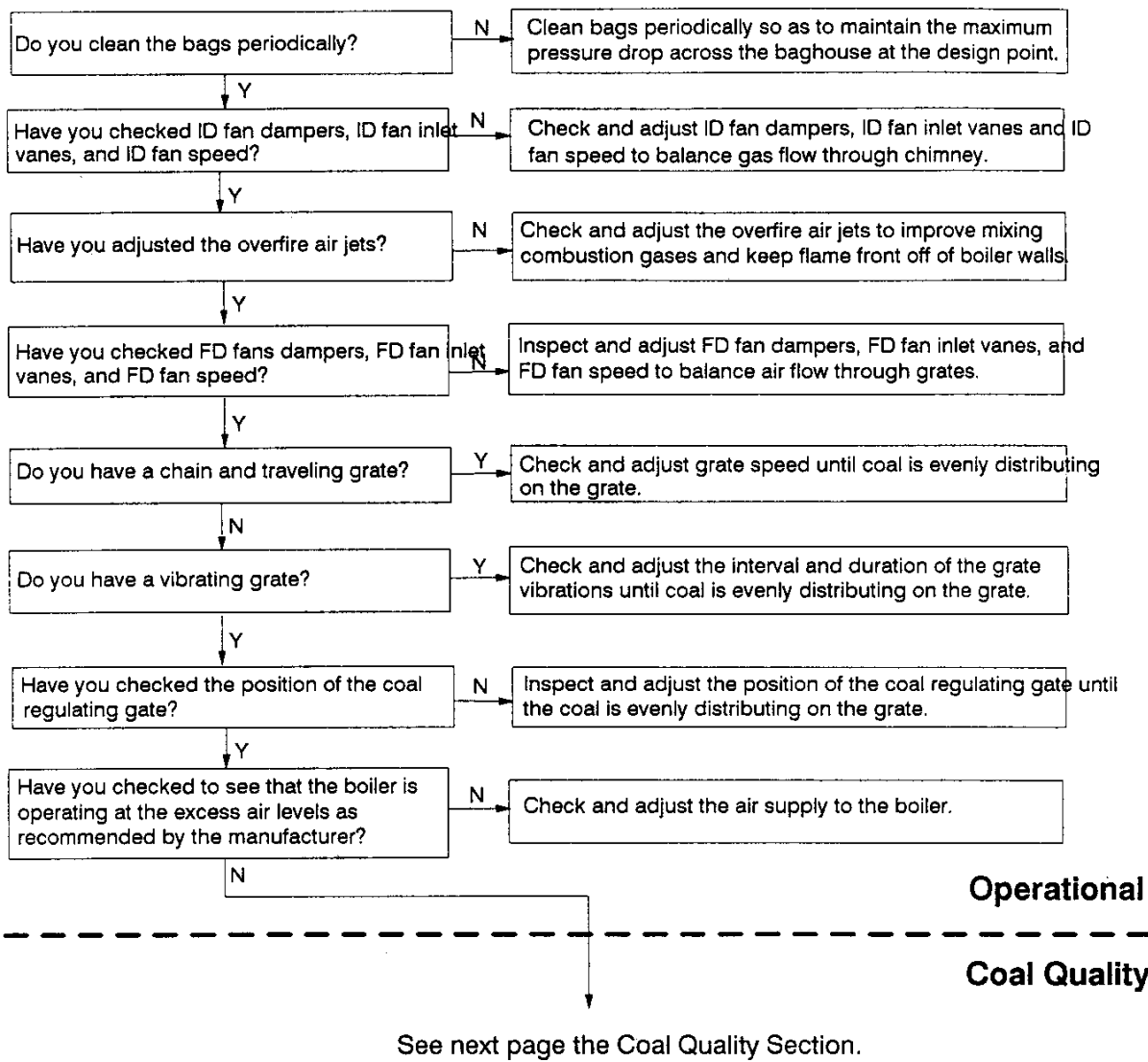


FIGURE 1-81 (continued): OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout From The Particulate Removal System
(Baghouse)

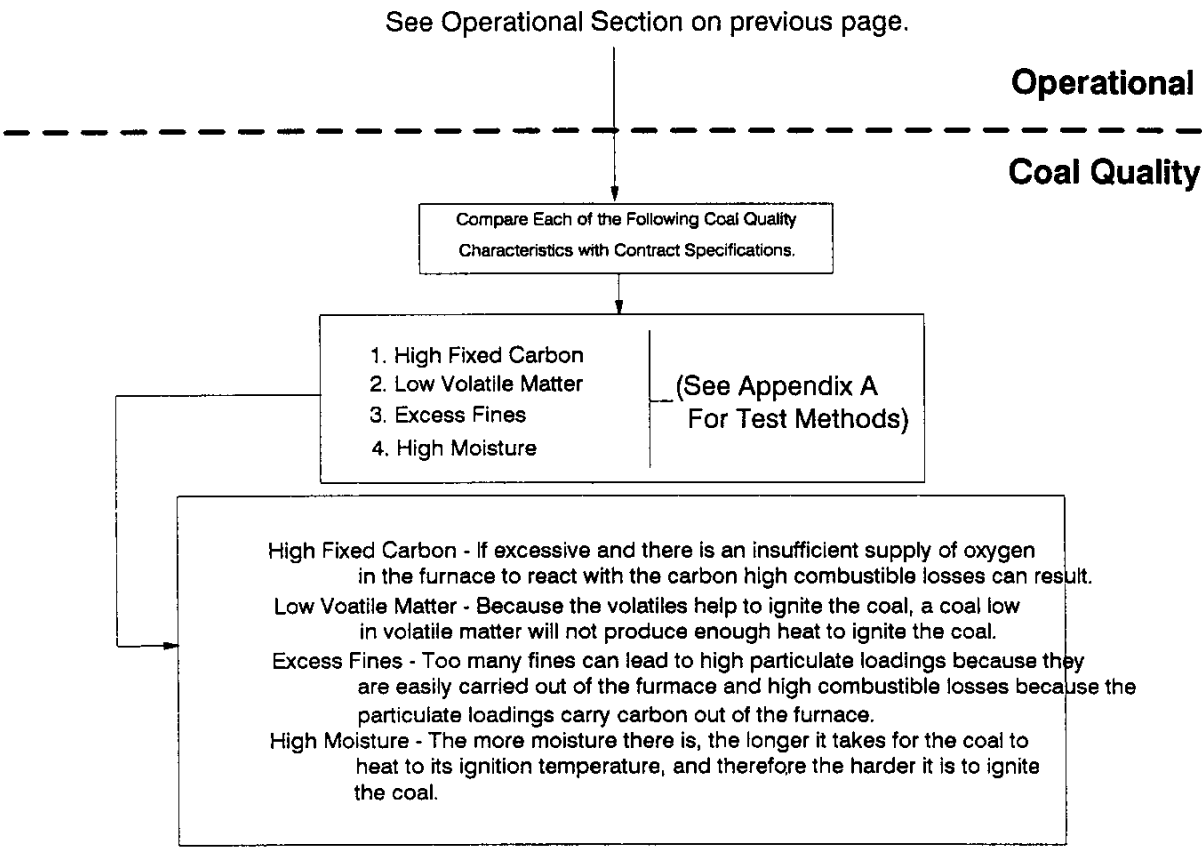


FIGURE 1-82: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Excess Particulate Emissions From The Particulate Removal System
(Baghouse)

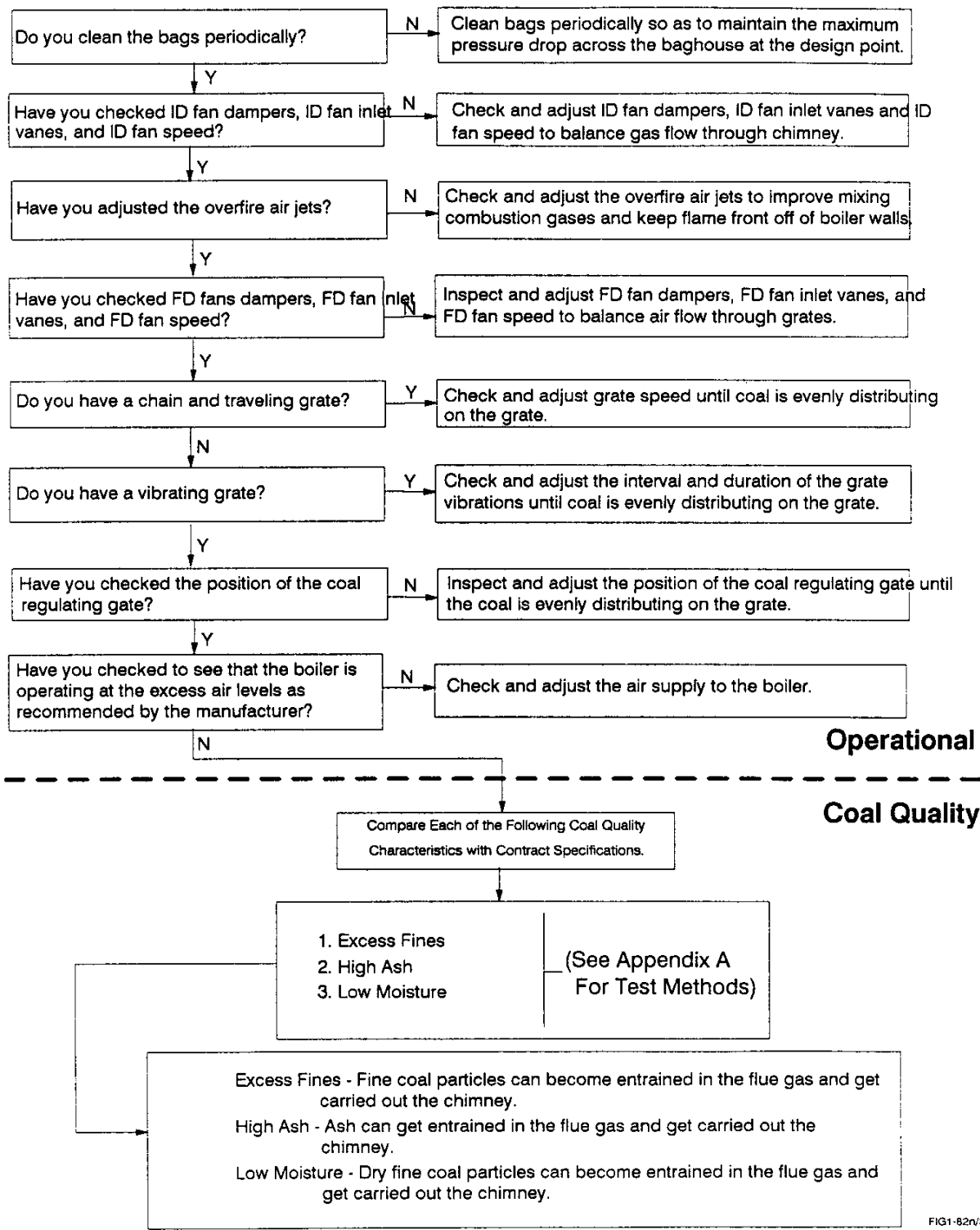
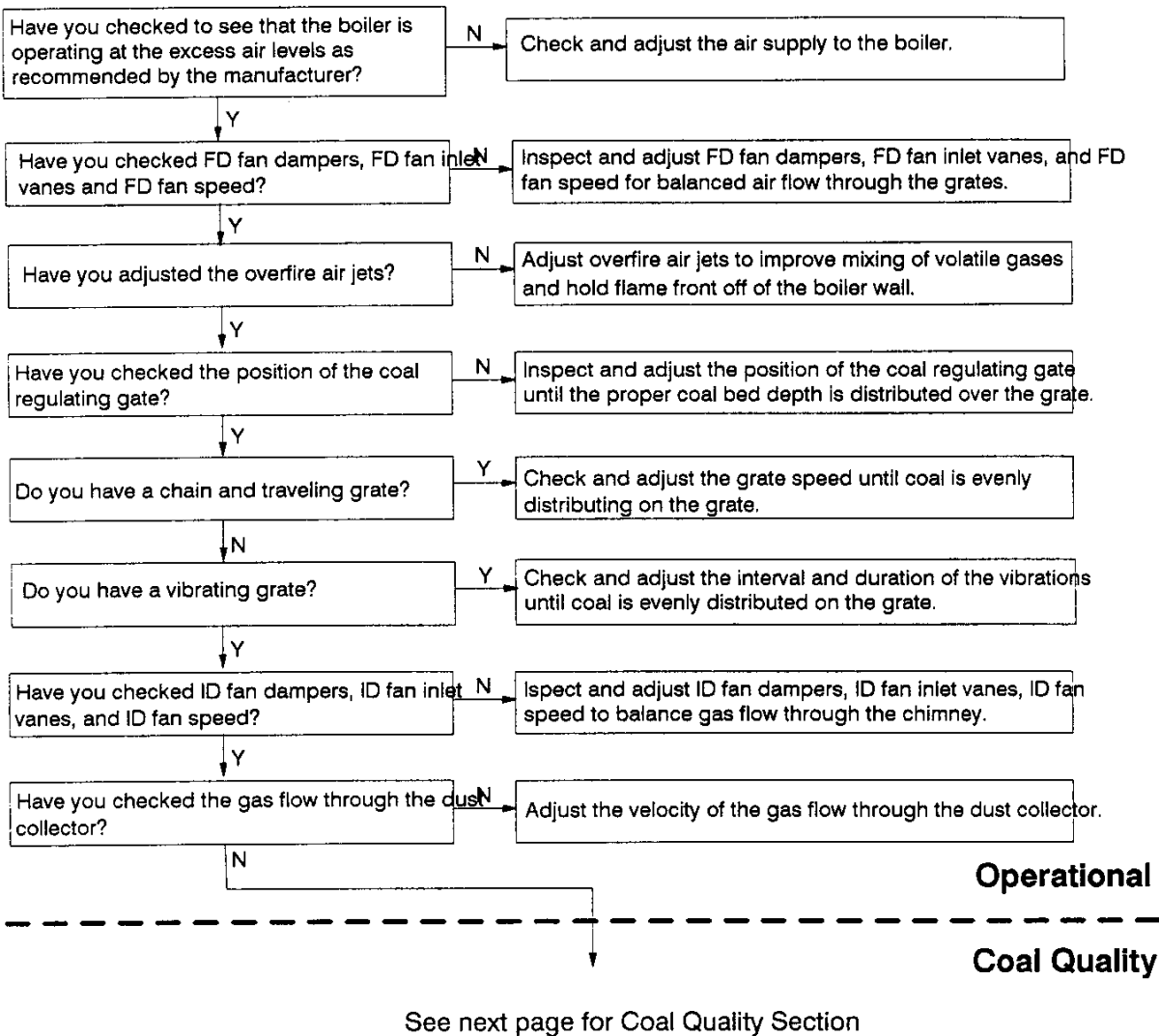


FIG1-82n/3

FIGURE 1-83: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Particulate Removal System
(Cyclones)



**FIGURE 1-83 (continued): OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Particulate Removal System
(Cyclones)**

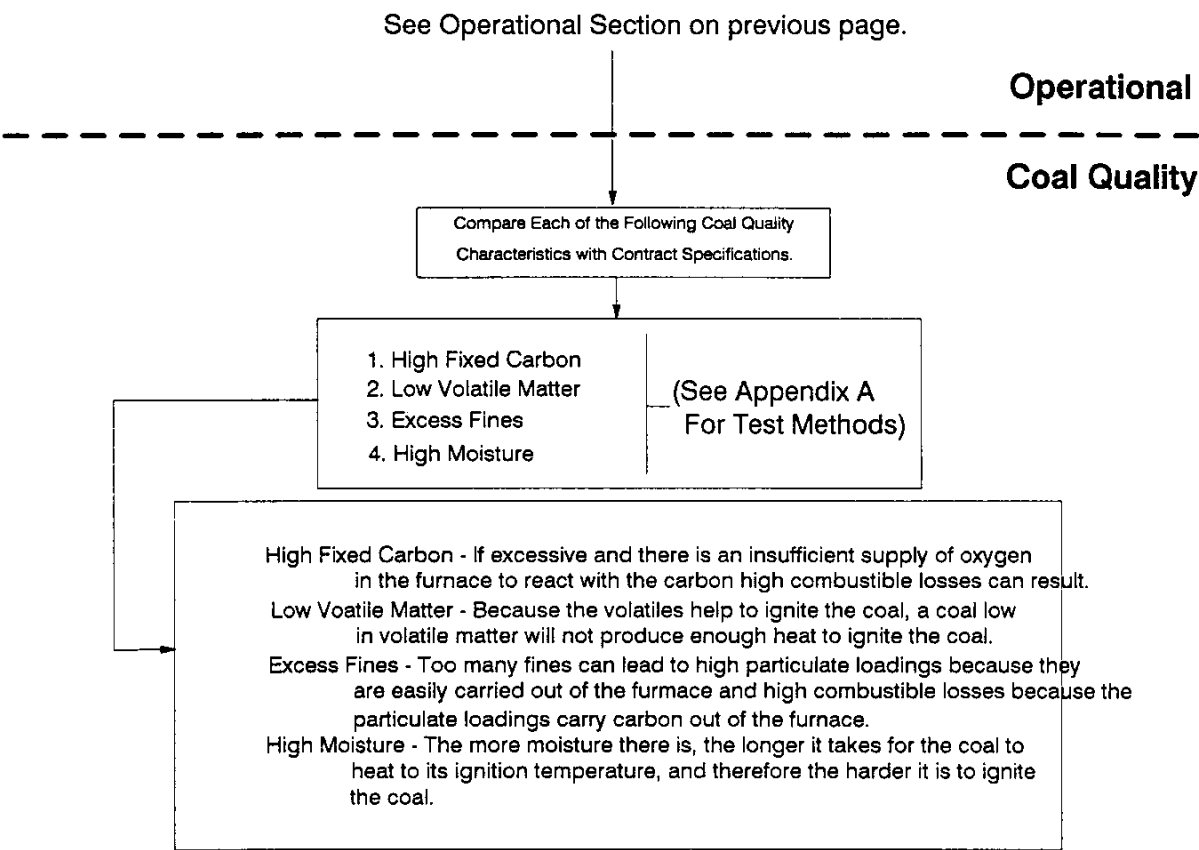


FIGURE 1-84: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erosion In The Particulate Removal System
(Cyclones)

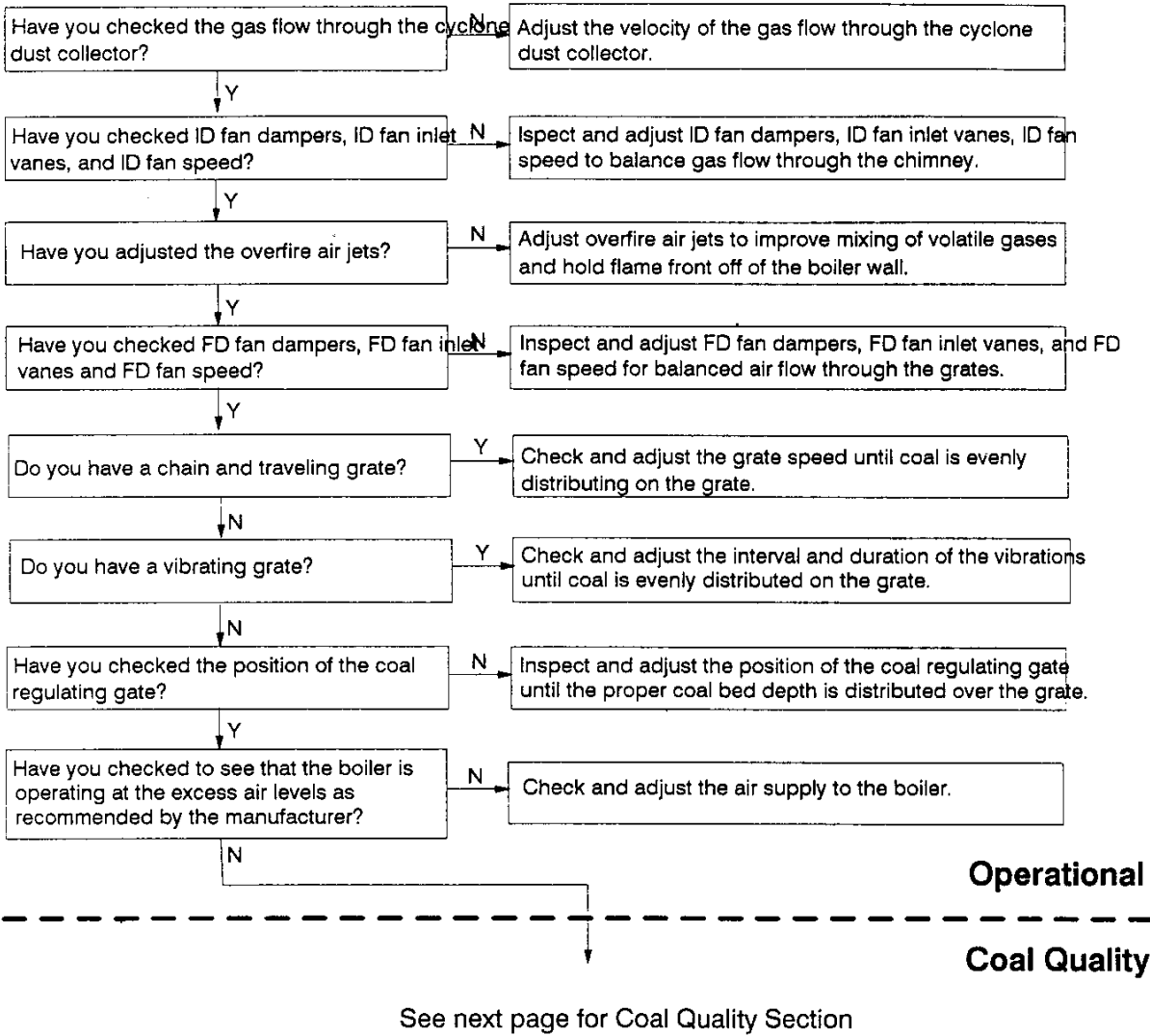


FIGURE 1-84 (continued): OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erosion In The Particulate Removal System
(Cyclones)

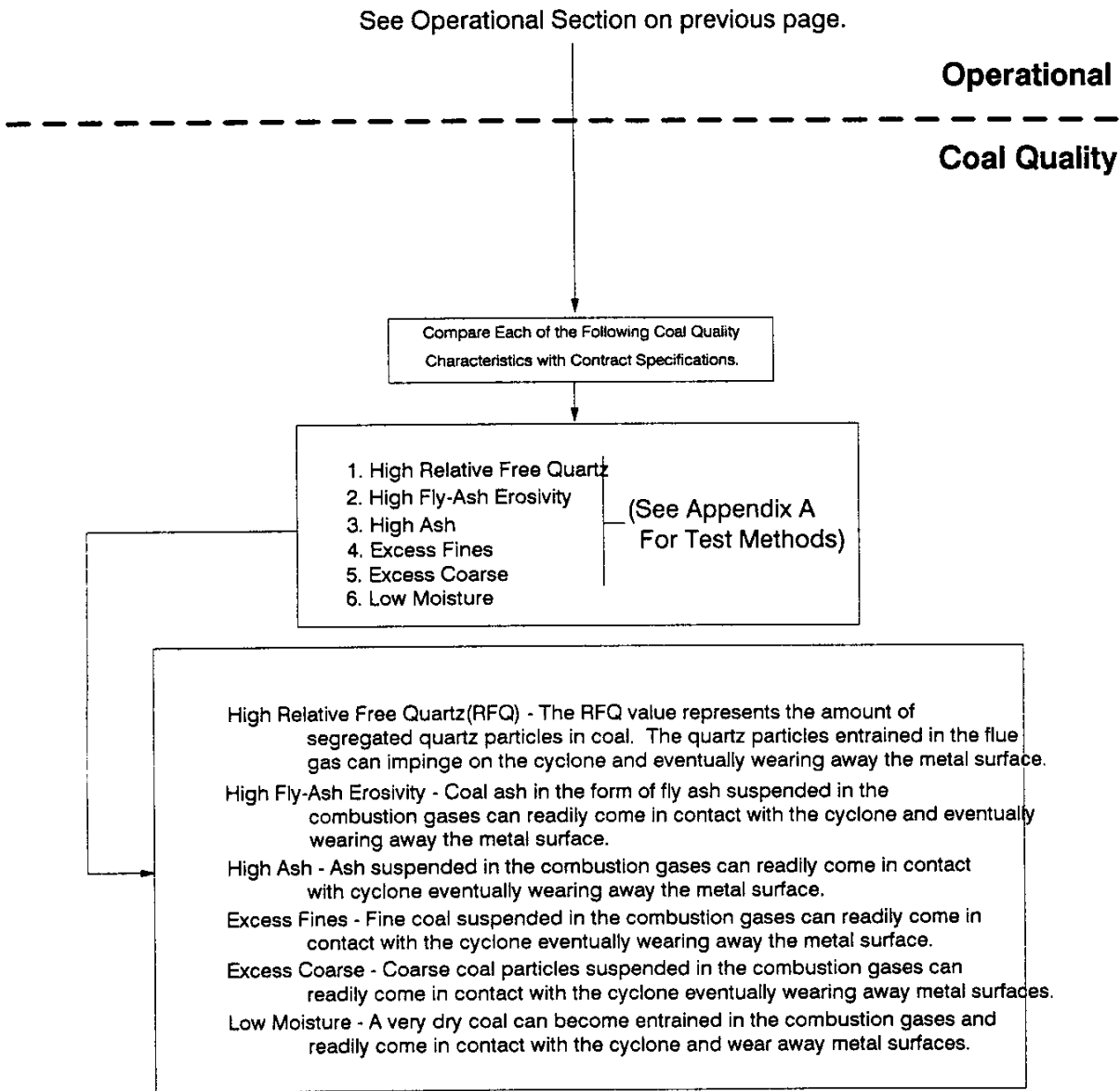


FIGURE 1-85: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Excess Particulate Emissions From The Particulate Removal System

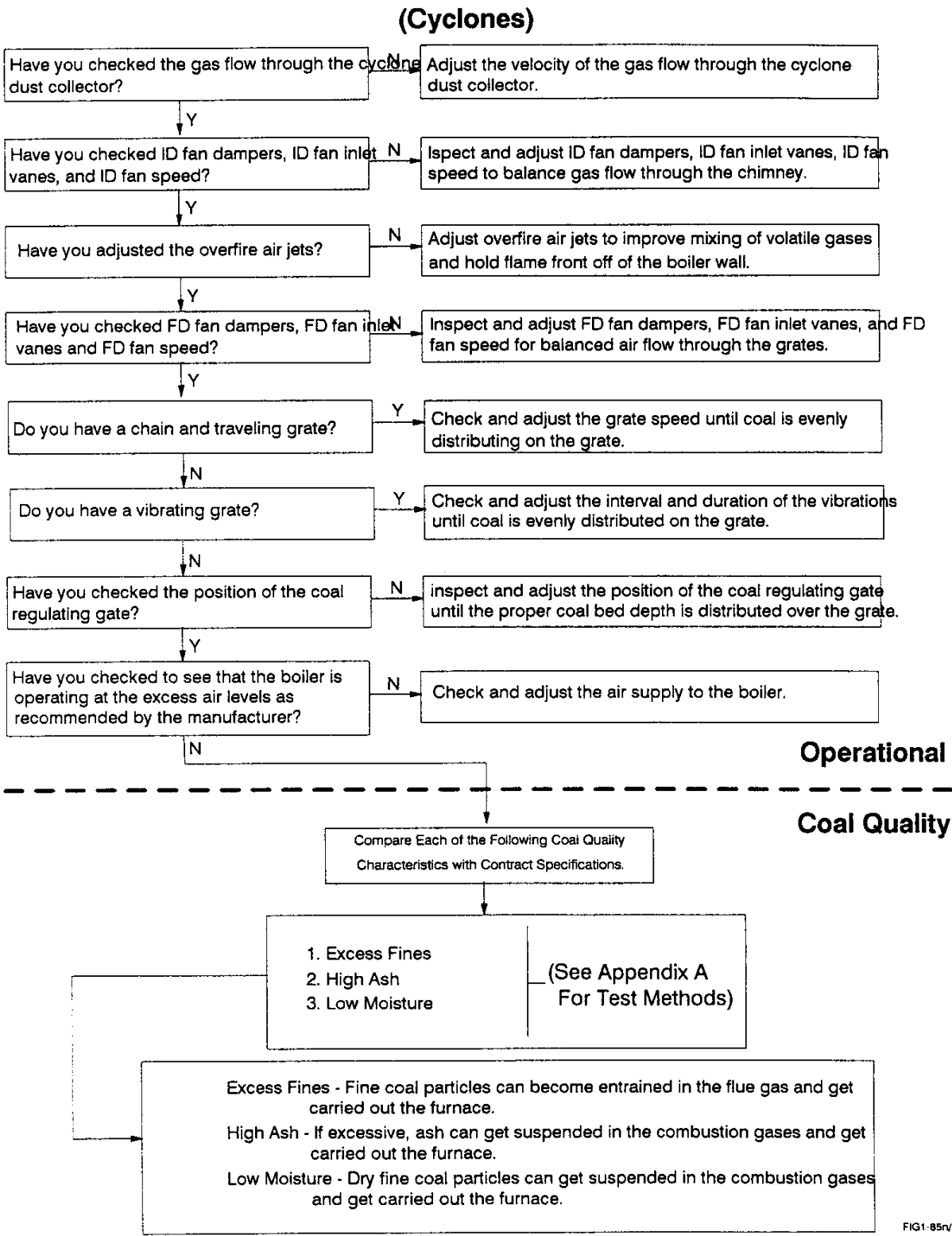


FIG1-85rv3

FIGURE 1-86: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Particulate Removal System
(Electrostatic Precipitator)

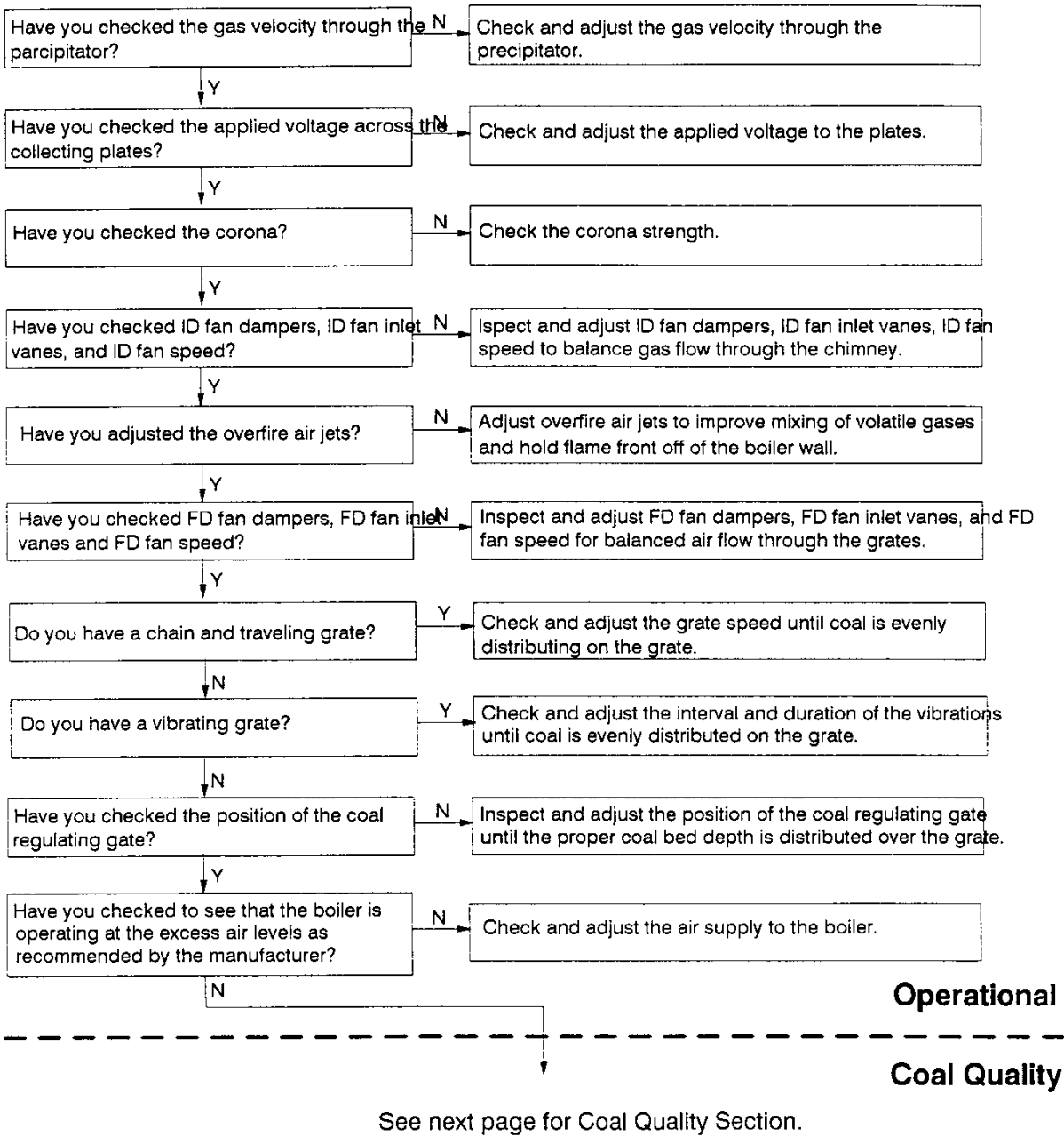


FIGURE 1-86 (continued): OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Particulate Removal System
(Electrostatic Precipitator)

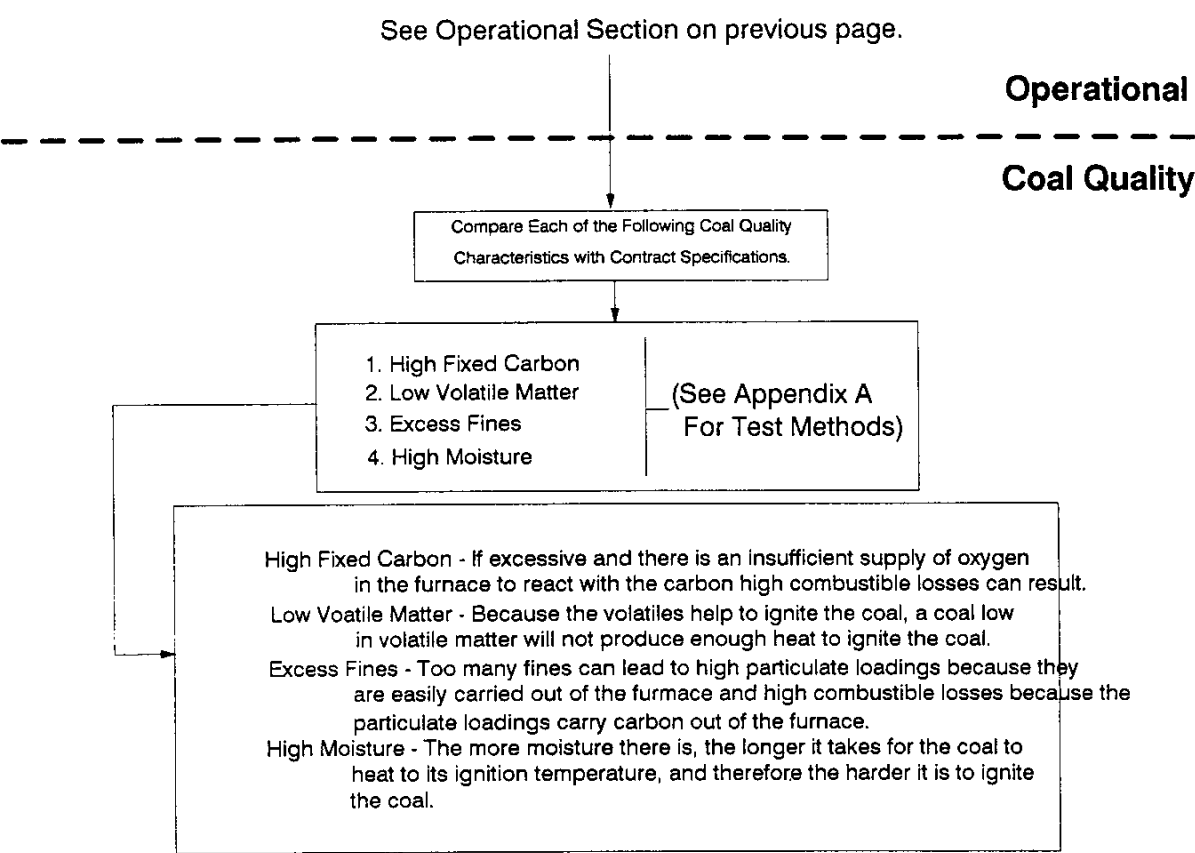


FIGURE 1-87: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of The Particulate Removal System
(Electrostatic Precipitator)

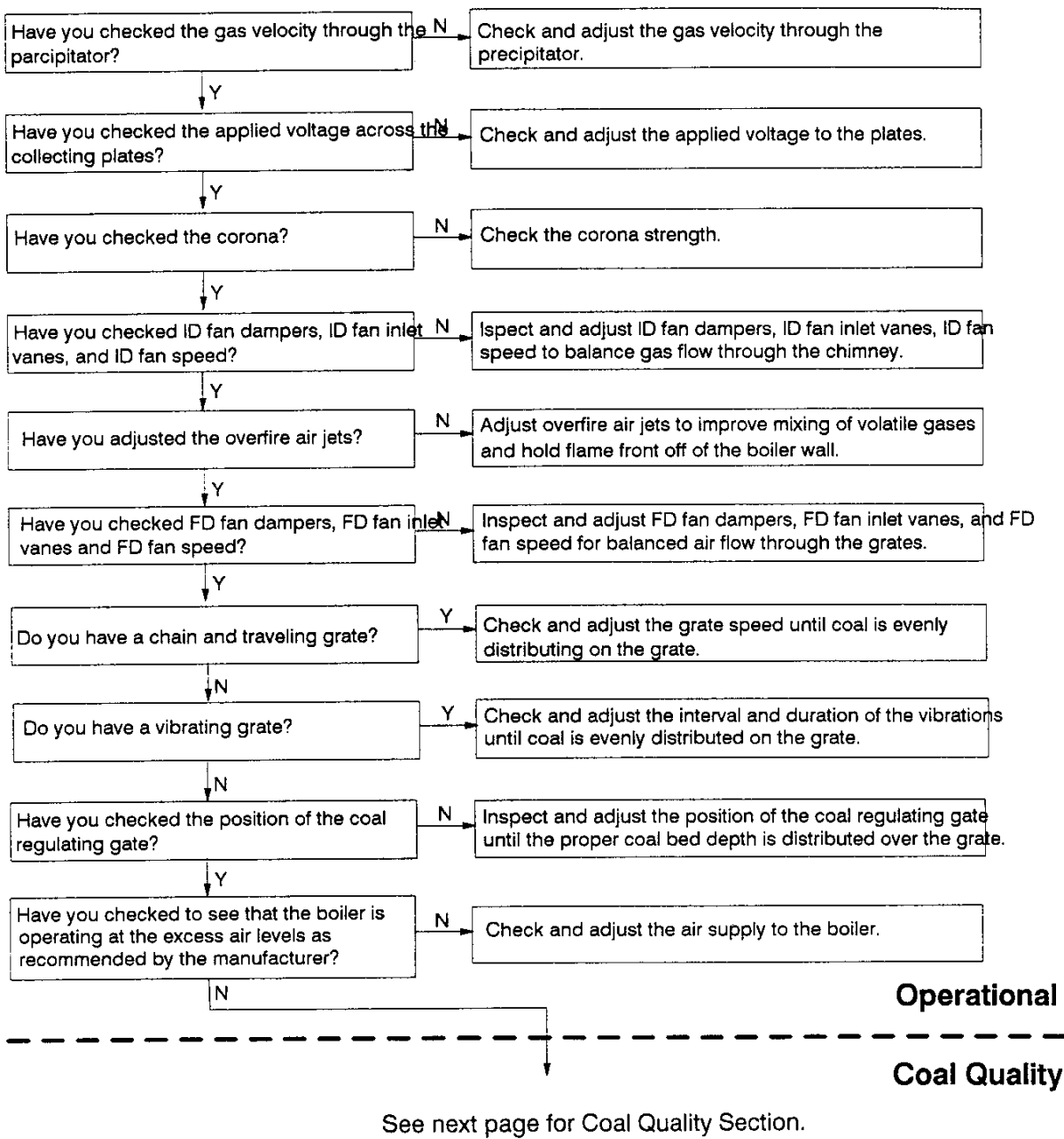


FIG1-87v3

FIGURE 1-87 (continued): OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Erosion Of The Particulate Removal System
(Electrostatic Precipitator)

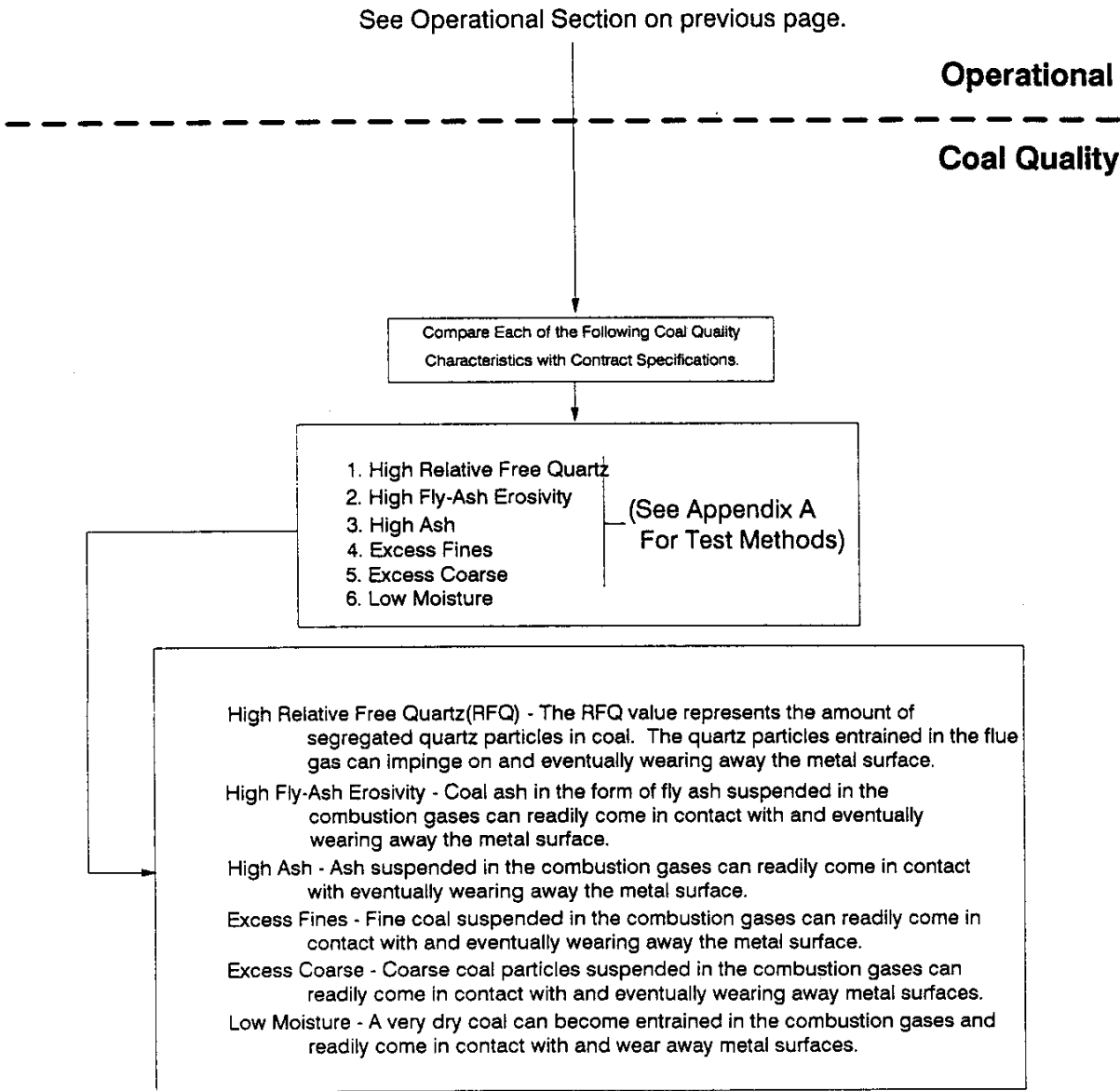
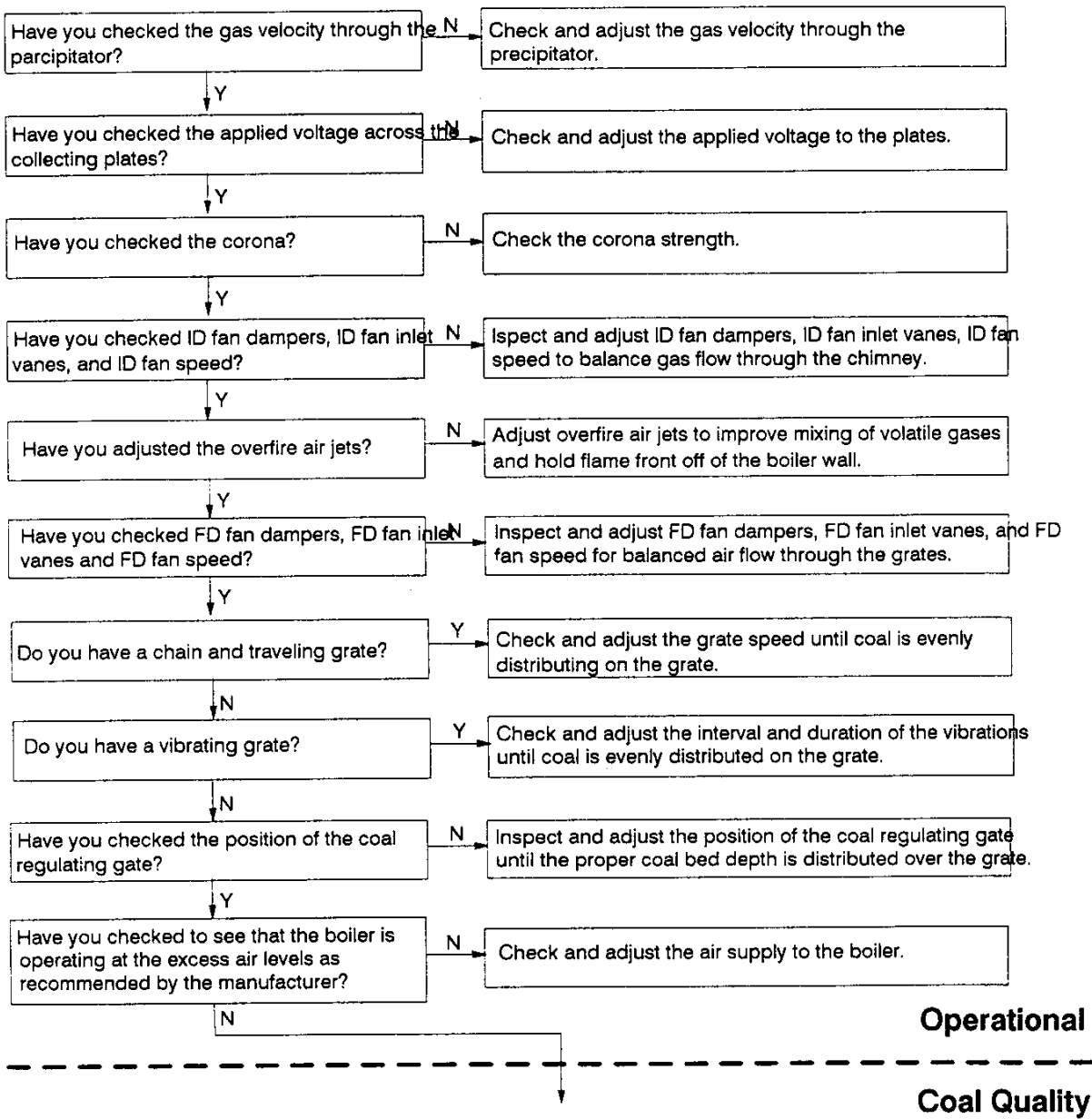


FIGURE 1-88: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Excess Particulate Emissions From The Particulate Removal System
(Electrostatic Precipitator)



See next page for Coal Quality Section.

FIGURE 1-88: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Excess Particulate Emissions From The Particulate Removal System
(Electrostatic Precipitator)

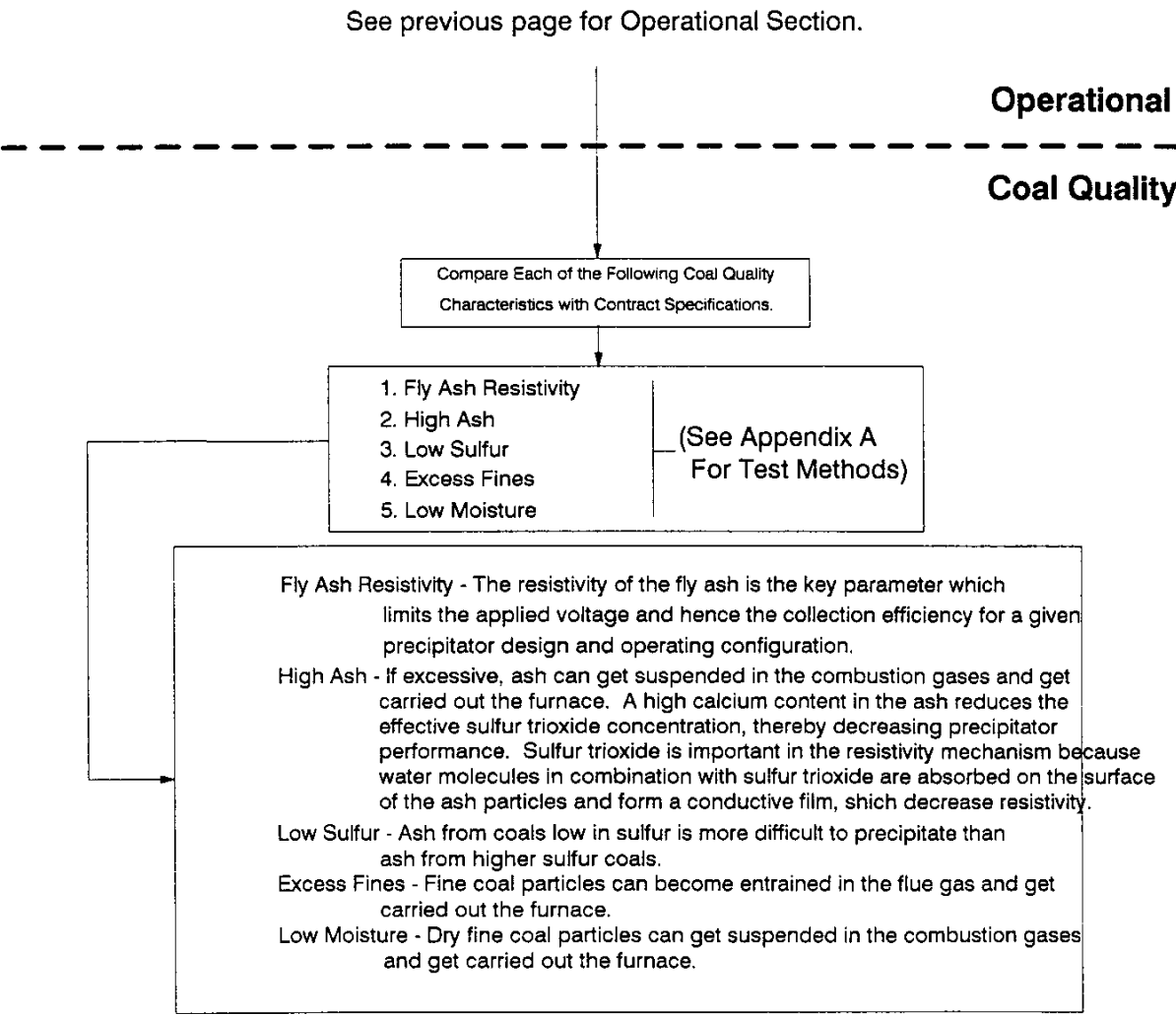


FIG1-88nb/3

FIGURE 1-89: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Fly-Ash Recycle

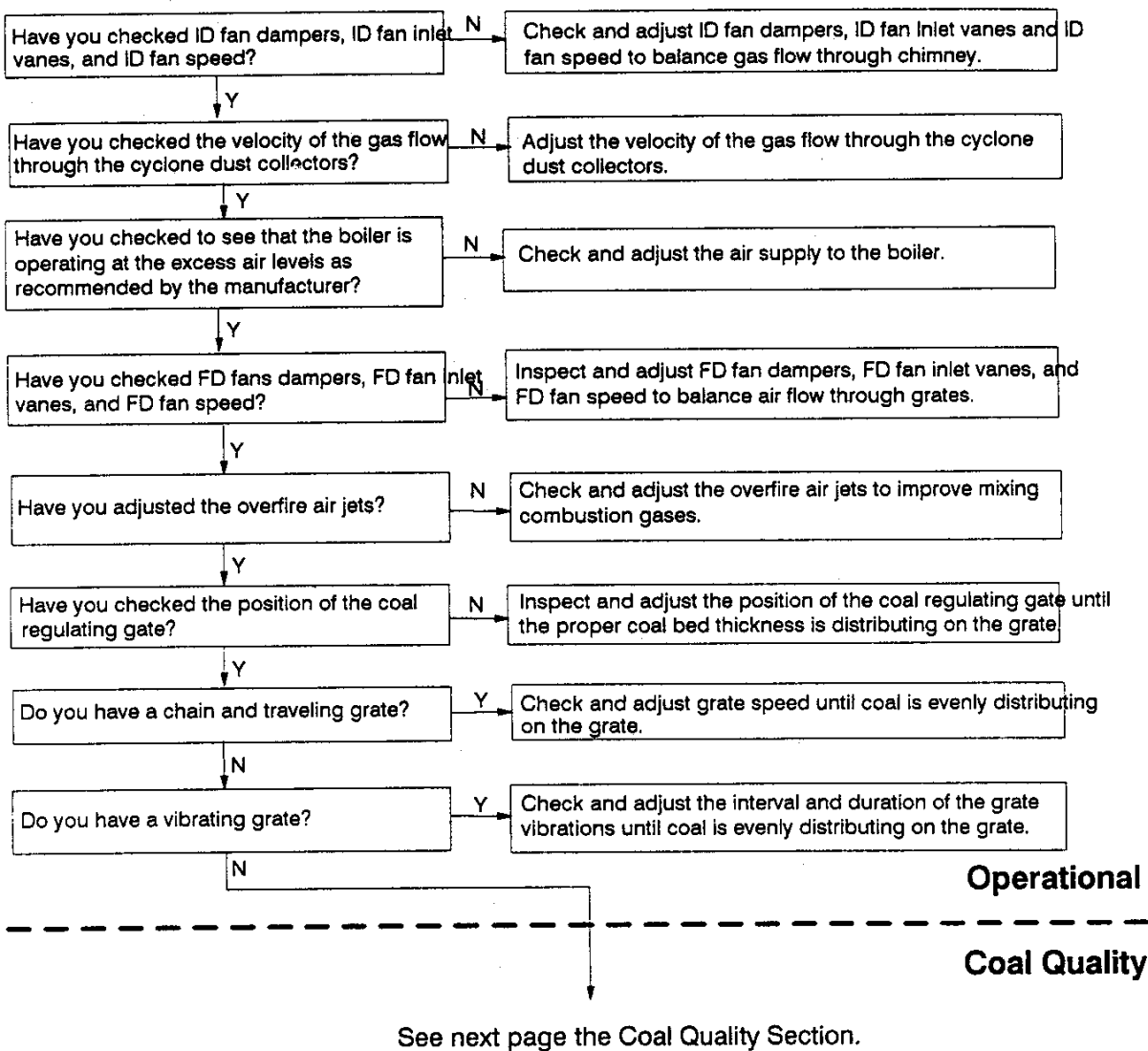


FIGURE 1-89 (continued): OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Fly-Ash Recycle

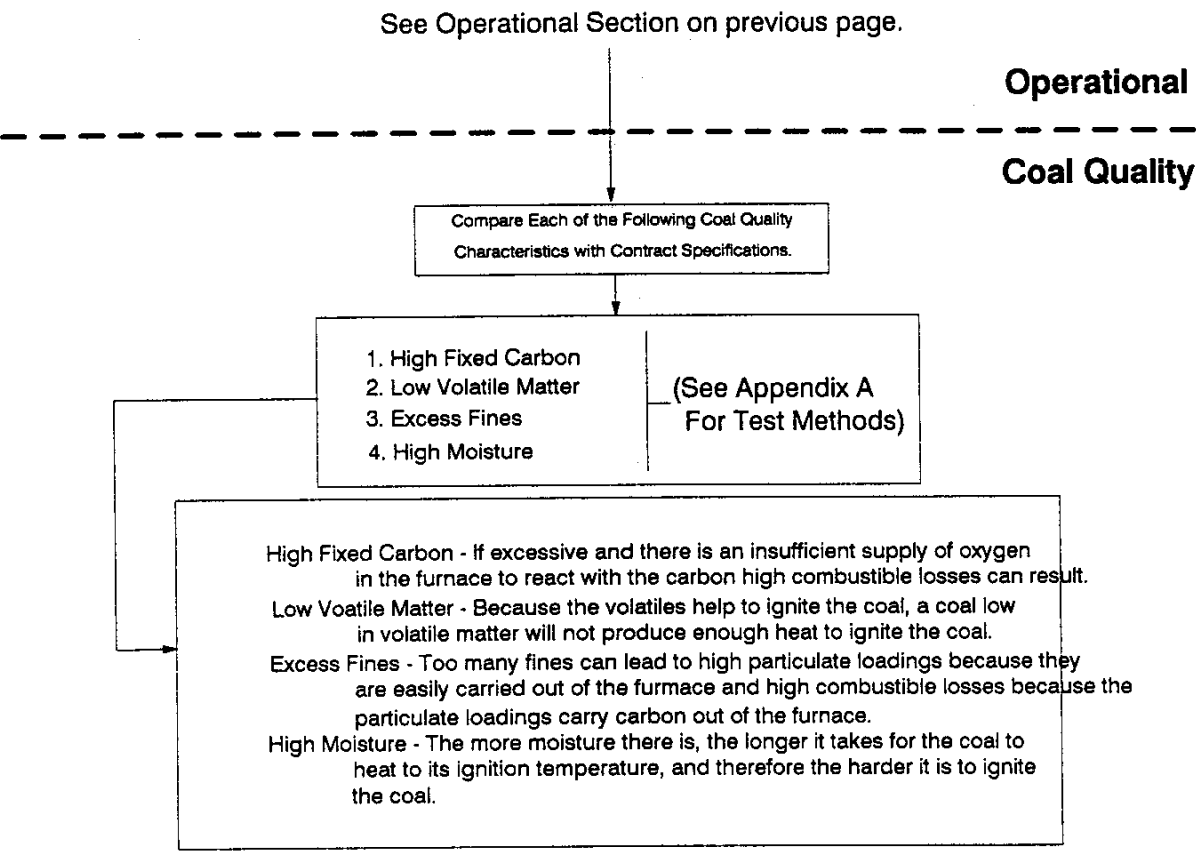


FIGURE 1-90: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Clinkers In The Ash Hopper/Pit
(Chain and Traveling Grate Or Vibrating Grate)

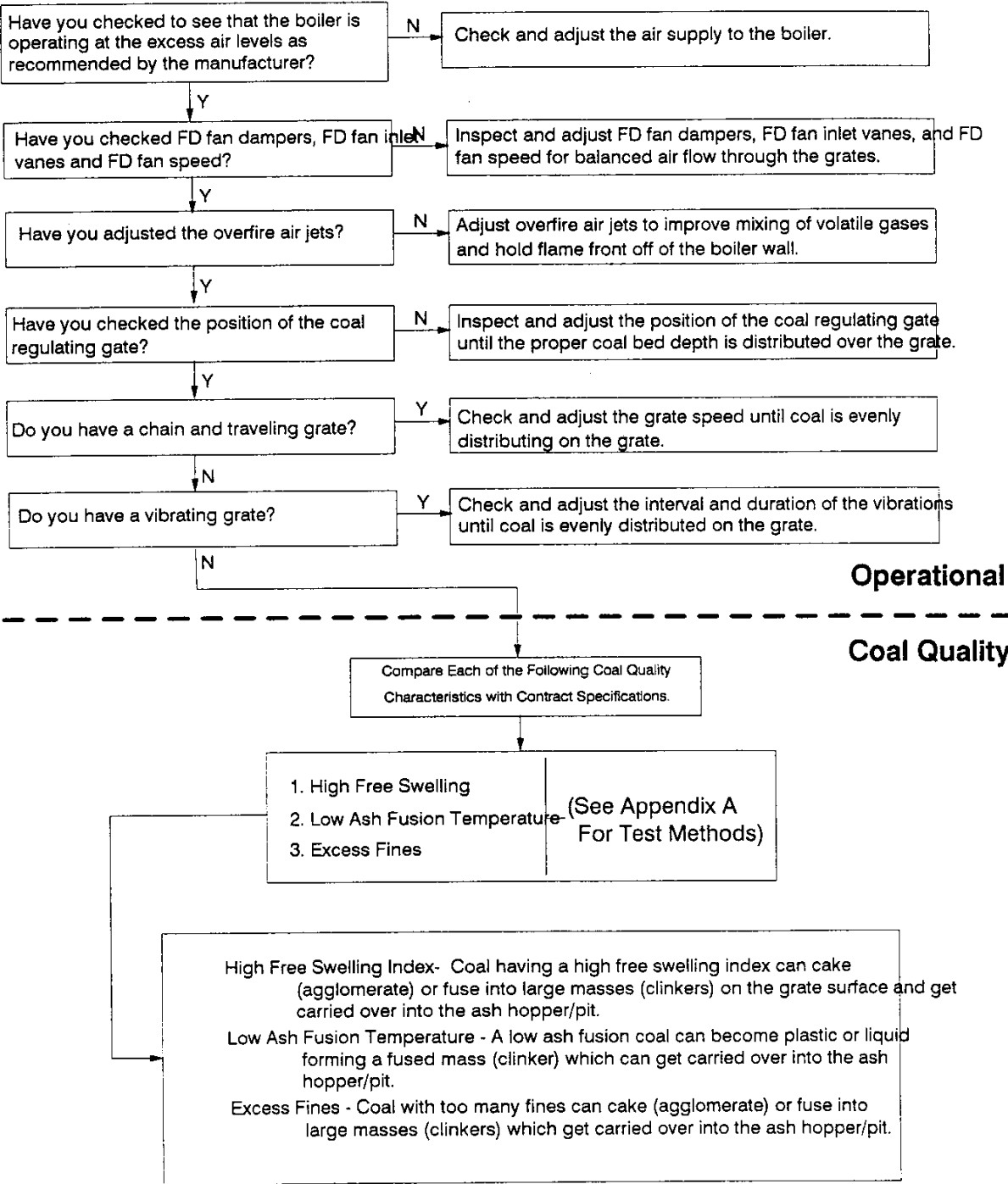


FIG1-90n/3

FIGURE 1-91: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Ash Hopper/Pit

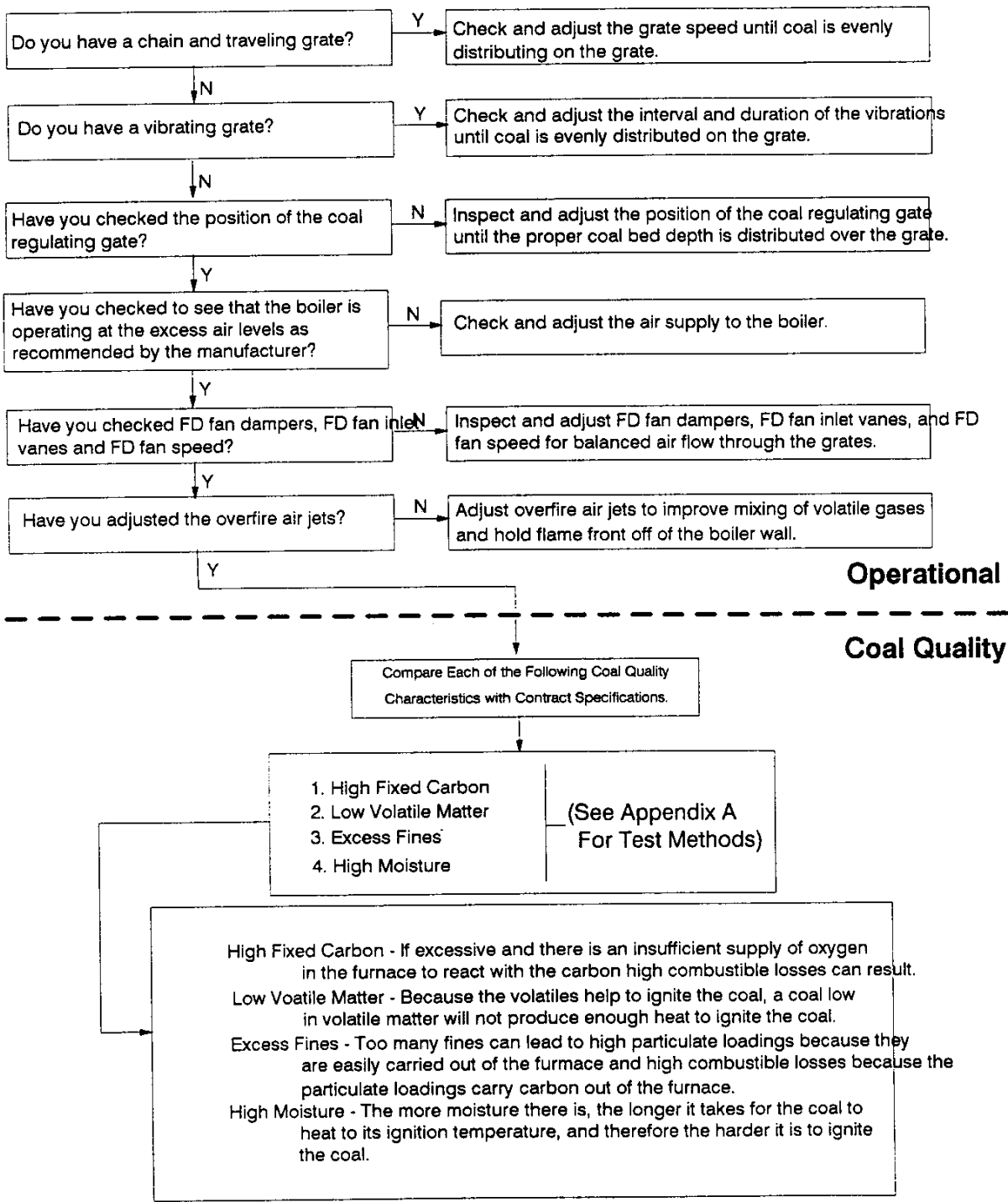


FIG1-91n/3

FIGURE 1-92: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Corrosion Of The Stack/Chimney

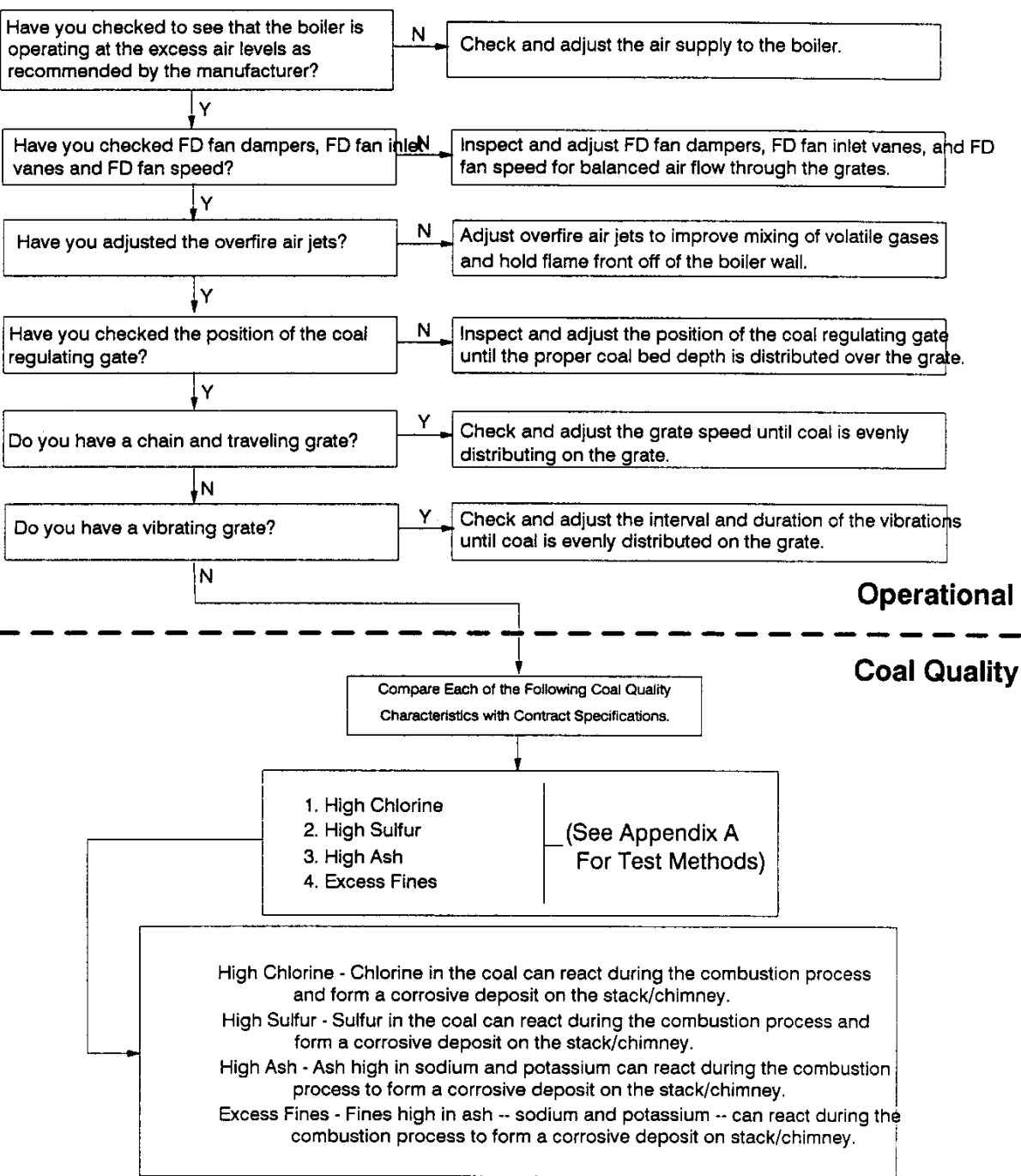


FIGURE 1-93: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Stack/Chimney

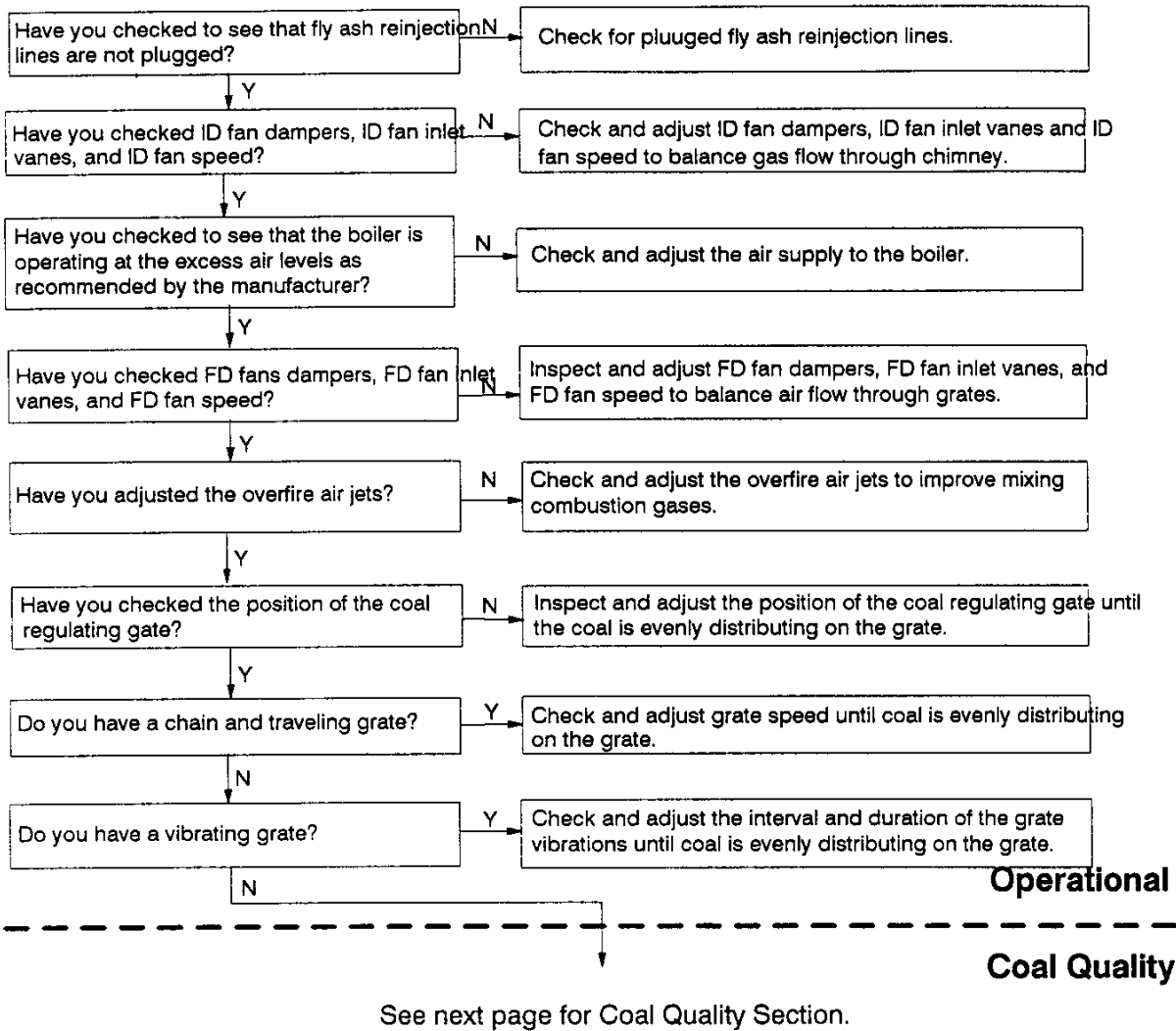


FIGURE 1-93 (continued): OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Carbon Burnout In The Stack/Chimney

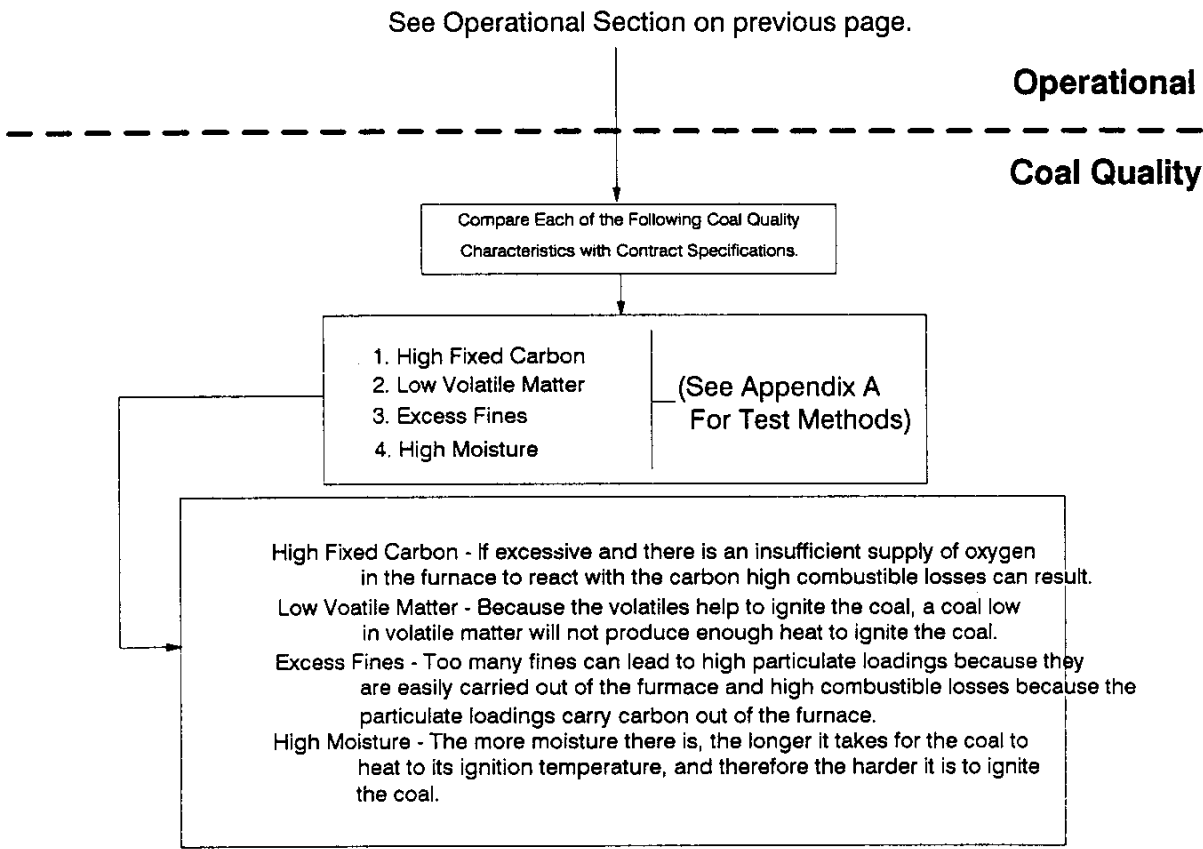
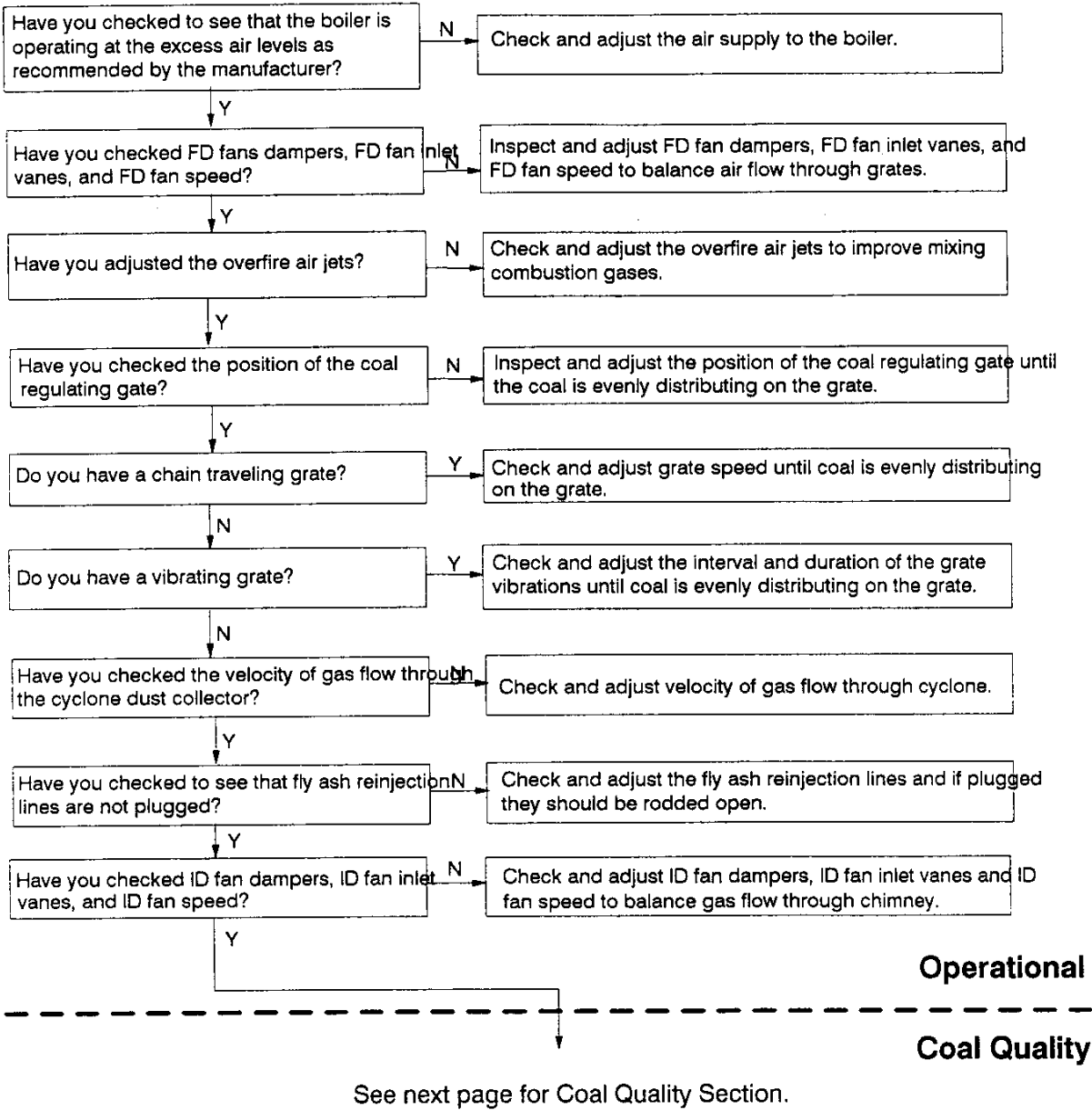


FIGURE 1-94: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Smoking From Stack/Chimney



**FIGURE 1-94 (continued): OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Smoking From Stack/Chimney**

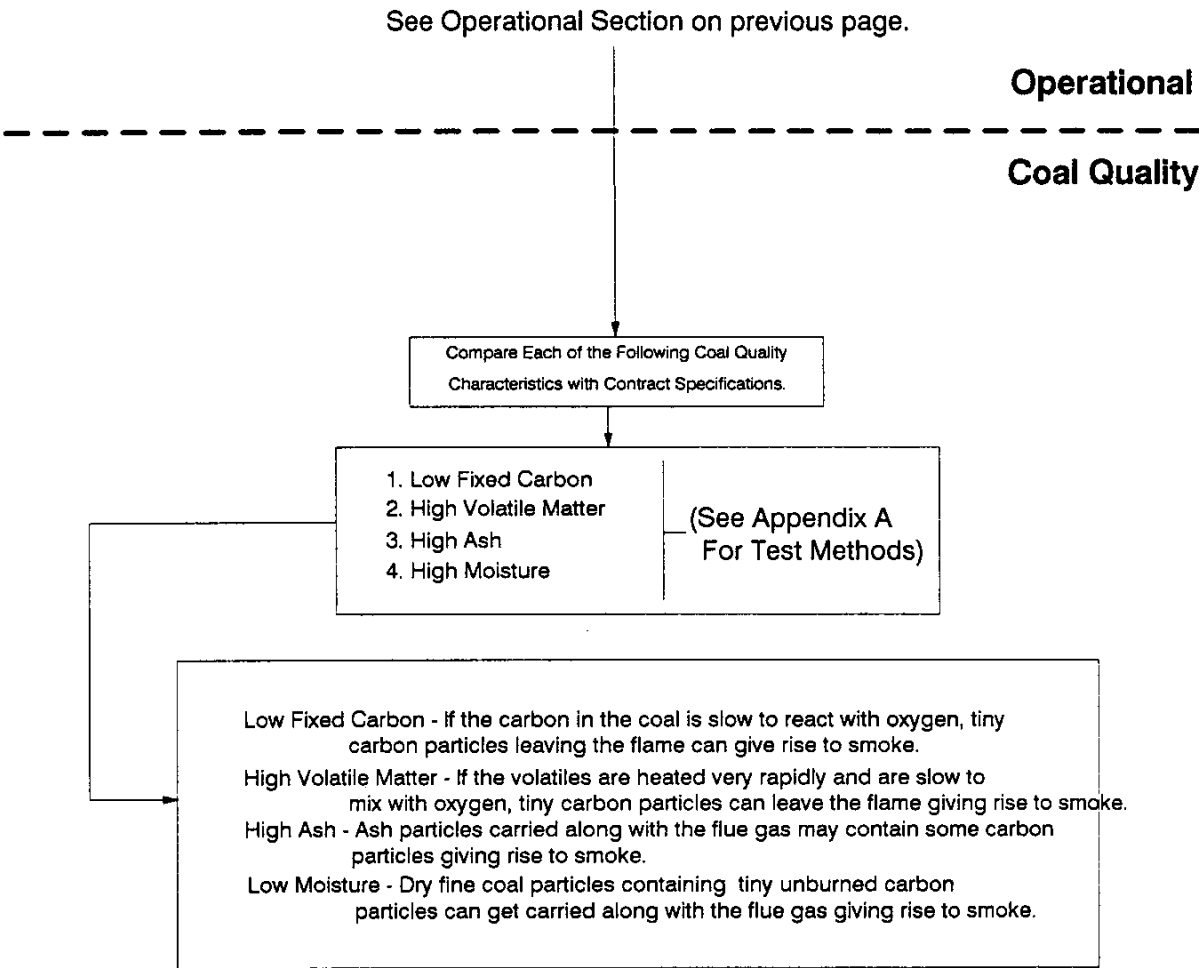
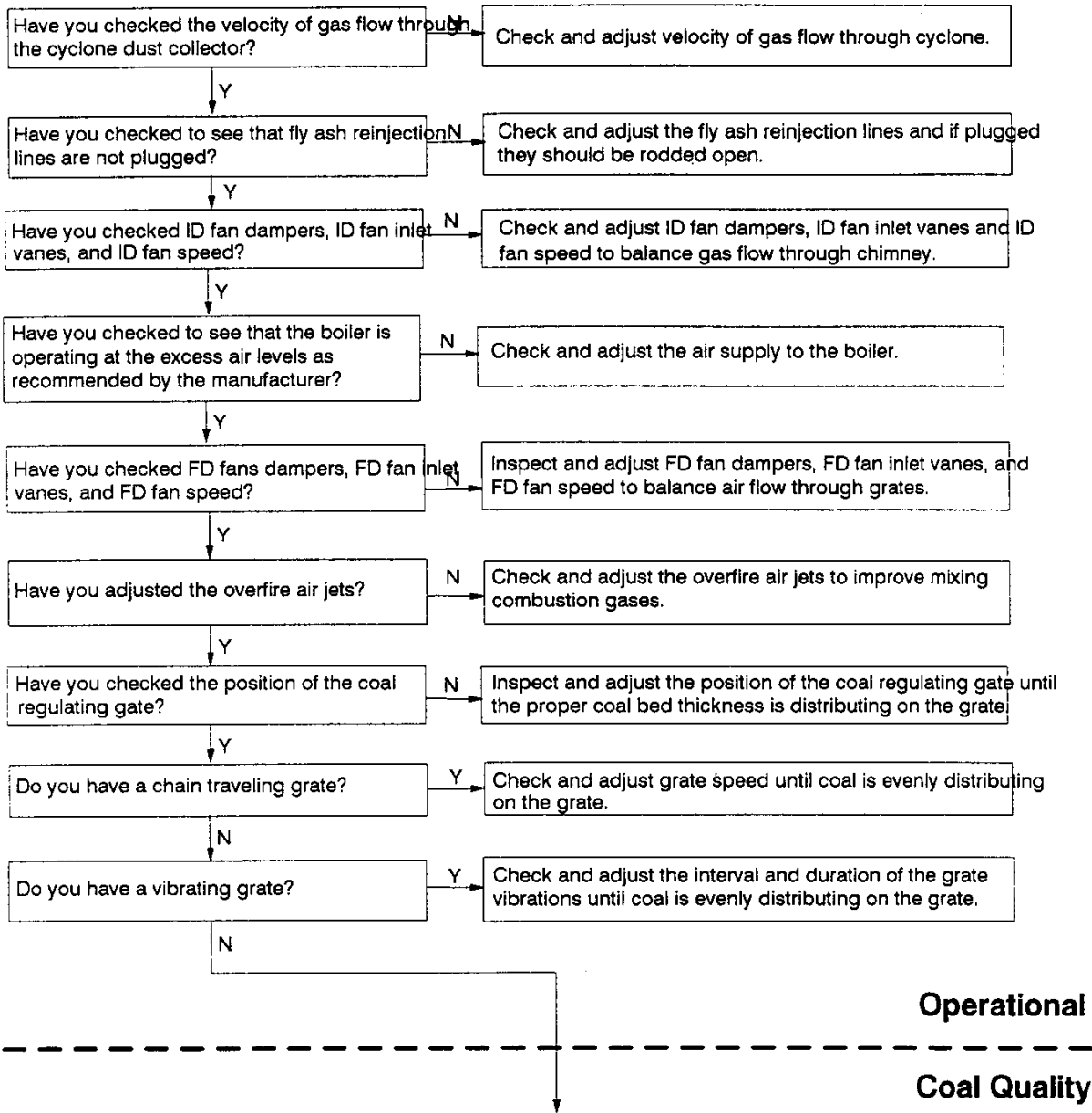


FIGURE 1-95: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Diagnosing Excess Particulate Emissions From The Stack/Chimney



See next page for Coal Quality Section.

FIG1-95n/3

FIGURE 1-95 (continued): OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For Diagnosing Excess Particulate Emissions From The Stack/Chimney

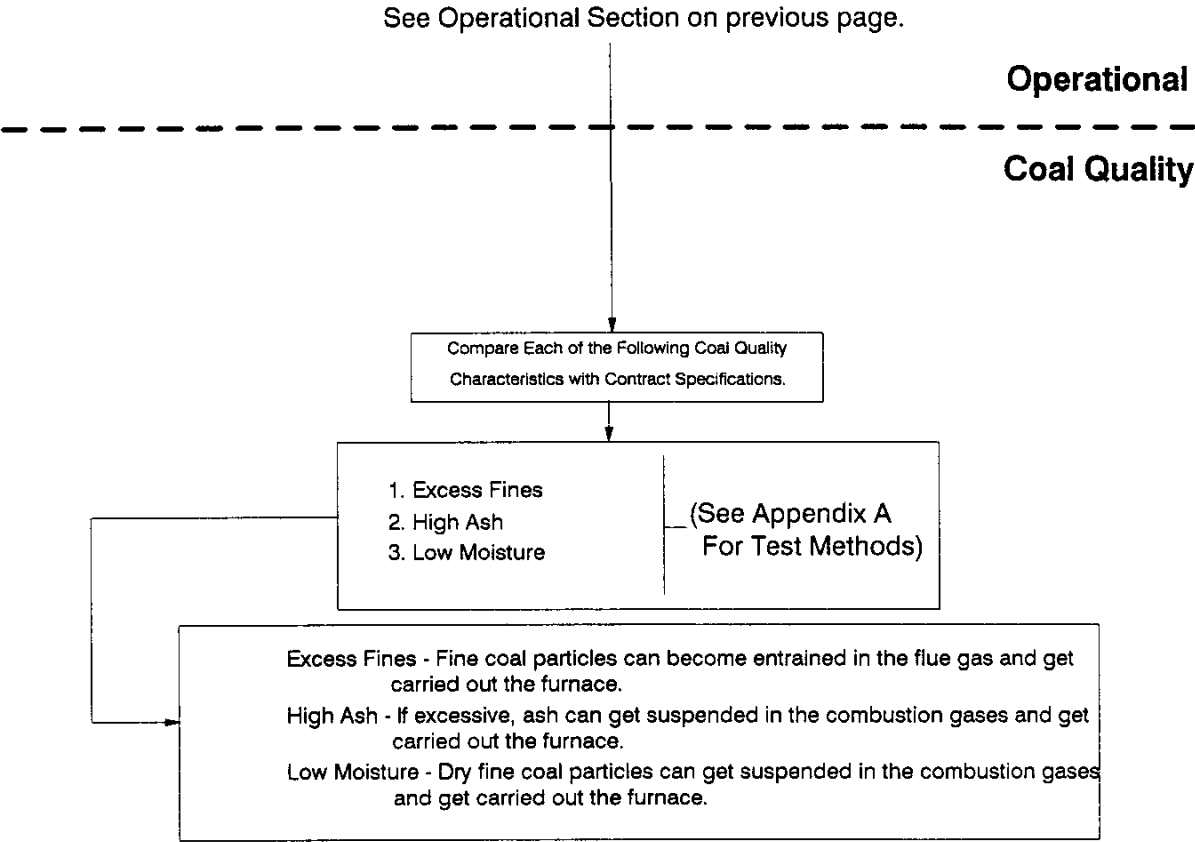


FIGURE 1-96: OVERFEED STOKER TROUBLESHOOTING LOGIC DIAGRAM
For SO₂ Emissions From The Stack/Chimney

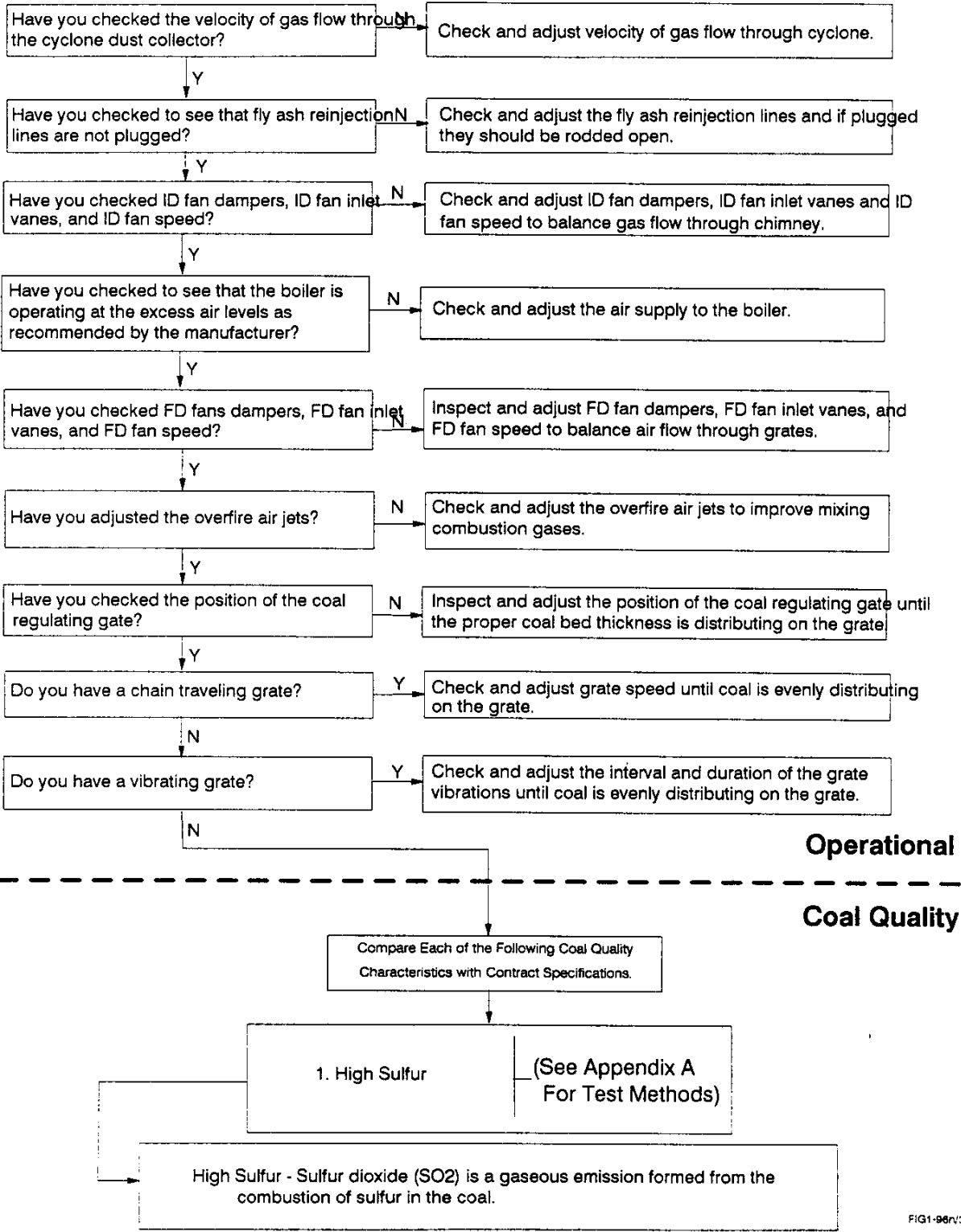


FIG1-96N/3

